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THE
AMERICAN
EXCHANGE AND REVIEW.

A MISCELLANY OF USEFUL KNOWLEDGE

AND

GENERAL LITERATURE.

ESPECIALLY DEVOTED TO FINANCE, MINING AND METALLURGY, INSURANCE, RAILWAYS AND
TRANSPORTATION, MANUFACTURES, PATENTS, TRADE, COMMERCE, ART,
JOINT STOCK CORPORATION INTERESTS, PHYSICS,
SOCIAL AND ECONOMIC SCIENCE.

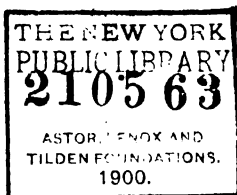
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No. 1.

OUR PUBLIC LAND POLICY.

TREES and vines bear more fruit for being pruned. If their branches are trained out to great length, their vigor is wasted in fruitless growth.

Men about to begin farming are usually advised to cultivate a few acres well, rather than many acres imperfectly.

So in peopling a country it would seem better that it should be settled thickly enough to occupy all the best ground as we go, than to scatter population over millions of square miles.

Yet the policy of our government, especially of late, (and in this it accords with the wishes of the people,) has been to diffuse population as fast as possible. Free lands are offered to induce men to abandon their eastern homes and associations, to isolate themselves on a lonely prairie, often without adequate means to benefit themselves or others. The vigorous growth of the West has in part been the result, but this has been gained by the depletion of eastern communities of those elements which should have kept them still the most influential politically, socially, and industrially.

Before the war of independence, French settlements were scattered along the great lakes and through the valley of the Mississippi. Most of these are indicated on maps by the French nomenclature, and often on the spot by neighborhoods of which the manners, religion, and family names have subsisted through a century of opposing influences.

Isolated from people of the same stock, and often remote from other settlements of any kind, they have lived a torpid, unprogressive life, retaining still the customs, opinions, and even the elsewhere obsolete words of the eighteenth century. Too far from markets to grow rich by trade, a Crusoe-like improvement of their lands and homes was almost their only means of bettering their condition.

At the close of the war of independence, settlers crossed the Appalachian range almost simultaneously along its whole length from New England to Georgia. A marked peculiarity of this movement, as compared with settlements of the present day, was in the continuity of frontier preserved as it progressed westward. Central New York, western Pennsylvania, west Virginia, and east Tennessee were thickly settled before Ohio and Alabama were entered. Sporadic settlements were few. Boone and his band of hunters in Kentucky were for a long time the only one of note. Even the facilities for immigration afforded by the Ohio river failed to draw population far down its valley. Louisville was early settled, but from that place to New Madrid, Mo., was a mere wilderness as late as 1810. All along the line of frontier, westward progress was slow. But substantial communities grew up complete in their character, so far as was possible in those times when free schools and other important adjuncts of our later civilization were unknown. Emigrants travelling slowly to their destination generally chose their homesteads for life. Rude homes they were, long and difficult transportation preventing their obtaining many things now accounted necessities, but they were thoroughly homelike. The steady, monotonous life of those settlers was not so educative as that of now-a-days, but was more promotive of sterling character and hearty feeling, and favored the growth of a vigorous race of such diverse types as Crocket, Clay, Jackson, and Harrison.

Slow as was the progress of settlement then, compared with what it has been since, it yet outstripped the provisions made by the government for disposing of lands to settlers. The Continental congress had indeed, in 1785, enacted the system of rectangular surveys, which has since been found so admirably adapted to fixing the limits and ascertaining the title to lands; but in the heavily wooded country next west of the Alleghenies, surveys were difficult and slow, and commonly far in arrear of settlement. Lands were not offered for sale until surveyed, and those settling upon them before purchasing were regarded in law as trespassers liable to ejectment by the government or purchaser. The minimum price was fixed at the low rate of one dollar per acre, afterwards raised to one dollar and a quarter; but settlers had not the right of preëmption, and had to pay at last not only for the land, but for improvements

made by themselves, to prevent their being bought up by speculators outbidding them. Such cases were so numerous as to induce the passage of several bills partially relieving them of their hardship; but it was not until the passage of the preemption law of 1841 that settlers upon the public lands ceased to be trespassers and were enabled to acquire a provisional title to their lands, which could be perfected by payment of the minimum price within a limited time. Still further to guard the interest of the settler, and to prevent land being monopolized by speculators, it has been customary to withhold it from sale for several years after being surveyed and opened to preemption. By later acts a settler on *unsurveyed* lands is entitled to the preemption of one hundred and sixty acres upon which he resides.

Thus by preemption any citizen could obtain a farm selected from the public domain before it had been culled over by speculators. But the good resulting was not his alone. By preventing large monopolies of land and inducing more of the population to become landholders, the government added to its own stability, and especially secured itself against being swamped in agrarianism and socialism.

Preemption was long deemed sufficiently favorable to settlers; indeed, it was all that a strictly equitable regard for the rights of the non-migrating population permitted. The small amount of revenue derived from the sale of lands little more than covered the cost of survey and sale.

During the decadence of the Roman republic, politicians placated the people by gratuitous distribution of breadstuffs. In our time they have courted popularity by voting away the public lands in free homesteads. Millions of acres have been worse spent. We shall speak of that in its turn. Just now we shall endeavor to show that the much lauded homestead law has been, on the whole, injurious to the interests of the country.

It is alleged in justification of the homestead policy and that of land grants to railroads, that by these means the settlement of unoccupied territory is stimulated. Every acre so improved is claimed as so much added to the national wealth; but the fact that the same labor and capital by which this new wealth was produced would probably have produced an equal or greater amount if it had never been shifted to the West is overlooked. The new stream of wealth is seen and noted, but the diminished volume of the old is not observed.

The greater number of both capitalists and individual adventurers who have engaged in it have been losers by the quest of the precious metals. Brigham Young only exaggerated the truth when he said that every dollar got from the mines of Utah cost a hundred. The great

and diversified resources of California have probably compensated for such losses; but doubtless the losses would have been fewer and development more wholesome if it had been slower. Of course it would not do to put checks upon enterprise, but it will be no less injurious to intensify that which is already overdone. We are more changeful and migratory than any other people, and this disposition already in excess is further stimulated by free gifts of land.

But it may be thought that the agricultural development of the country is not overdone. In some respects it certainly is not. We should like to see greater thoroughness of cultivation in the older States. In the new it will not pay; or, at least, farmers think so. This is a sore evil. They have got so far from market that almost nothing but beef and pork will bear carriage, and even these must be raised by the cheapest possible system of herding. This is the condition of Kansas, one of the most flourishing, and certainly the most rapidly growing of the Western States, as fertile as any, unsurpassed in climate, abundantly supplied with coal and good building stone, so beautiful and salubrious as to be sought merely for a residence; yet, with all these advantages, were it not for the influx of new comers with fresh wants to be supplied by purchase from older settlers, farmers there would often be hardly able to do more than earn a living. Farming is overdone there; there is a glut of every kind of produce, which is somewhat relieved along the frontier by government purchases of supplies for troops and Indians, and by the demands of the mining population of Colorado; but, where access to this fortuitous market cannot be had, farm products will not usually sell for what the farmer could have earned if employed as a day laborer. Yet he perseveres year after year, living a life of serious privation; for it is by this means he acquires a title to his homestead of one hundred and sixty acres. Five years so spent on the verge of settlements, without a market from which to obtain the means of improving his farm, without a comfortable home, without most of the unbought ameliorations of life which formerly surrounded him—is the price of his piece of land. A large proportion of the population are thus spending their years in raising crops which must be forced upon the market at any price, until its condition is that of a chronic glut, yet a glut which is unnatural, and would be impossible but for some such factitious cause. Many thousands are thus wasting the prime of life in compliance with the form by which the title to land is transferred to them by the government—a process as fruitless as the turning of a crank by which, at the end of a thousand revolutions, a beggar obtained a penny which dropped from the wheelwork.

This is the case of those who honestly fulfil the requirements of the

homestead act. But there are about as many more who fail to do so, wholly or in part, who yet, by a fictitious residence, or by pure perjury, obtain a patent for their quota of land. Some comply with the letter of the law by erecting a cheap shelter and occasionally sleeping under it, but spend most of their time in occupations which keep them far from the place they call their residence. After acquiring a title to the land by acting this farce for the specified term of five years, the squatter is commonly ready to sell to some speculator or real settler, who pays to him, instead of the government, a price which has not been earned by any useful act, the squatter being in such cases a needless "idler wheel" in the machinery of transfer.

Such is the practical working of the homestead system which has been superimposed upon that of preëmption. Preëmption sufficiently guarded against the danger of large tracts being monopolized by speculators; land, after survey, being open to settlement by preëmptors years before it could be bought for cash. Settlers had the option of acquiring a full title to their land by paying for it after six months' residence, or of deferring it, as in most instances, for several years, without meanwhile paying either taxes or interest on its value. Being obliged to pay for it at last, however, left less inducement for shiftless squatters to waste time merely in securing a title, or to commit a fraud in so doing. Preëmptors who have not fulfilled the requirements of the law in other respects usually allow their claims to lapse at last by default of payment, or if they are brought to a successful issue, the irregularity or fraud is of no direct detriment to the government, which invariably receives the regular price.

Land grants to railroads are the other principal means of securing the supposed benefits of the rapid settlement of vacant territory. These are never unbroken tracts of land, but are invariably alternate "sections" of one square mile each, chequerwise. The sections are regularly numbered; those assigned to corporations are simply designated as "the odd numbered sections." One reason for always granting odd numbered sections is that in each township of six miles square two "even sections," numbered 16 and 36, are first of all set apart for the support of local schools. Government having secured the construction of a railroad by giving away one-half of the land along its track, and for a width usually of forty miles, the value of the remainder is presumed to be so enhanced that its price is fixed at double that of lands lying beyond the limits of the grant. The enhanced price, however, does not compensate the government for the full moiety which it has alienated, for the remaining half is greatly curtailed already; first, by one-ninth being allotted to schools; next, by most free homesteads within the limits of the grant

being of full quarter sections, but most of all by claims antedating the grant itself. Probably the average proportion upon which the government receives the enhanced value is less than one-fourth of the whole. But this loss is of comparatively small importance. The additional cost of the lands to settlers, too, is presumed to be compensated by their proximity to railroads. We may admit this and much more, and yet leave the essential fallacy which lurks in the system of land grants untouched. "The roads would not have been built but for the land grants." Just so; they would not have paid; capital could be better employed elsewhere. Wherever invested, the same capital would have been more profitably employed, and that without the enormous gratuities necessary to urge the work of building railroads through vacant territory. Political reasons may have justified the construction of one Pacific railroad; but had the capital used, and to be used, in building other roads for the sake of subsidies been expended in much needed improvements, which are able to prove their right to be, by yielding a revenue commensurate with their cost, as great benefit might have been gained without the subsidies. We should then have had fuller development of the older States, instead of a small population scattered to little purpose over territory too wide for ten times their number.

When at length these roads should have been built, they would have gone by the best routes to where the demands of traffic called them, and not have been located at random, or rather rambling about at will so as to gobble up the best lands, as is being done by a subsidized company now building a road across the plains.

These subsidies are not so great a drain upon the national treasury as are the expenses of the defence, government and mail facilities required by the sparse population of the territories, which contribute almost nothing to revenue, but whose expenditures are more nearly proportioned to their area than to the number of inhabitants. The claim that these scattered settlements tend to prevent Indian hostilities is negatived by the fact of their multiplying points of possible collision with the Indians.

The local government of these thinly settled territories is also enormously expensive. Counties are either so extensive as to make courts almost inaccessible, or, if of moderate dimensions, of so few inhabitants that they are heavily taxed to support a county organization nearly as costly as that of older counties with tenfold their numbers. There are new counties where half the people are not yet out of their "dug outs," which have already sunk hopelessly into debt, not by rash outlays on public buildings or improvements of any kind, but merely through inability to meet ordinary expenses. If our thinly settled frontier were

but a narrow strip as formerly, a few months of the present tide of emigration westward would suffice to change it from a wilderness to a well peopled country, but when spread over so great a space, years must pass before the meagre population becomes politically and socially self-supporting.

Such is the character of the growth which has been stimulated by artificial means, until the too widely spread branches cannot bear their own weight. The tree certainly makes a greater show, but it is less sound and strong than if it had been allowed to grow naturally. Like a farmer attempting to do too much, we have left older fields half cultivated, while breaking up ground which lies too far out to be conveniently worked or cheaply fenced; and this we do to earn bounties paid by ourselves. The restless, adventurous, enterprising character of the American people will ensure their rapidly subduing the wilderness without the aid of artificial stimulus. What needs rather to be fostered is a disposition, which most of us lack, to do thoroughly what we are about before engaging in other matters which may interfere with it. This is as true of our railroads as of our farms. Many roads are so crippled by reason of their incomplete construction and equipment as to suffer an annual loss of a sum which would put them into good condition. Yet, instead of completing the old, their owners are spending much greater sums on new roads. If the cost of building roads beyond the limits to which a paying traffic extends had been spent in perfecting the railway system within those limits, we should have been doubly gainers. The improvement of our natural channels of communication, if it can be kept from running into jobs and monopolies, is still more urgently needed. But, most of all, we need that the waste places be reclaimed, which now serve but to separate well populated districts. Ohio, for example, is half composed of such tracts, many of them reclaimable swamps of the richest alluvium; yet thousands of her people are annually drawn away by free homesteads and premature building of railroads beyond the Missouri. Less capital so spent, and more invested in manufactures, would also tend to concentrate production so as to dispense with much of the great and unnecessary cost of transportation.

It is too late now to correct the evils which have resulted from lavishing the public lands as an inducement for population to extend itself over more ground than it can use, but it is not too late to indicate the fallacy which underlies that policy, so long as we still have or may acquire unpeopled territory.

The voting of land warrants to soldiers and of land scrip to the several States for the purpose of endowing agricultural colleges, has had little effect upon the progress of settlement. The warrants and scrip are

seldom used by the grantees, but pass out of their hands at a heavy discount, and are finally sold to settlers or other purchasers of public lands, to be used by them as so much cash. The practical effect, as to the government, is the same as that of voting a money bounty; to the recipients it is that of receiving one, diminished sometimes more than fifty per cent. by the process of conversion. It was merely a wasteful and roundabout way of doing what could have been much better done by a direct appropriation. Had the government appropriated enough at once to establish the colleges, making it payable, like the bond subsidies to the Pacific railroads, only as legitimately expended, and supplemented this by an annual payment for their support, conditioned upon their fulfilling the requirements of the law, we might have had a more effective system of agricultural colleges at less cost.

LONDON STREETS.

ABOUT this time every year, says the Saturday Review, there is a periodical outcry as to the condition of the streets of London. People write angry letters to the newspapers,* and remark to each other in conversation that it is disgraceful and intolerable; and then at the end of several days the wind changes, the mud dries up, and the whole matter is forgotten until the next sloppy weather reproduces exactly the same wretched state of things, and revives the familiar and fruitless grumbling. It is perhaps not surprising that people who are supposed to live in a civilized town, and who pay rather highly for the supposition, should be somewhat put out when they have to wade through such a sea of filth as has recently flooded the streets of the metropolis. Footpaths and roadways have been equally befouled. It was impossible to cross the road or to go from one street to the next without being soaked and splashed with fetid mud, while at the same time the dirt on the pavement was gradually puddled into the consistency and adhesiveness of deep clay, except in places where it had a polish and slipperiness which might have consoled skaters for the sudden failure of ice in the parks. Day after day the mud lay on the streets, becoming thicker, slushier, slabbier, more viscous or more fluid, according to circumstances, without, as far as could be seen, the slightest effort being made to get rid of it; and if any effort was made, it was utterly impotent and ineffectual. It might have been supposed that the dirt was in the nature of a Providential dispensation with which it would have been impious to meddle.

It was let alone as scrupulously and religiously as St. Anthony's pigs. Some parts of the town were worse, some better, than others; but wherever one turned there was no indication of anything having been done to diminish the all-pervading nastiness.

It is not unnatural that ratepayers who find a charge for cleaning the streets figuring to a considerable amount in the demands which are made on them should be disposed to resent the existence of such a mud-bath at their doors, and should ask with some impatience how it happens that no arrangements are made to deal with a nuisance which in such a climate must be of not infrequent occurrence, or why, if arrangements are made, they are not enforced by the proper authorities. The present outcry has perhaps been somewhat louder and more violent than usual; but it can hardly be said that the condition of the streets, however disgraceful and humiliating, has been much worse than it always is in similar weather. The most curious circumstance is that this miserable state of affairs, whenever it occurs, seems to be regarded as something quite novel and unprecedented, and that the complaints and protests which it excites, however vigorous they may be for the moment, die away as soon as the immediate unpleasantness begins to abate, without the slightest preparation being made to prevent or mitigate its recurrence. In the course of the next few weeks we may possibly have a fall of snow, and then we shall probably witness another melancholy example of paralyzed and helpless resignation. It is known historically that snow does occasionally fall in these latitudes during the winter, and there has been nothing abnormal or exceptional, as far as we are aware, in the meteorological conditions which produced the muddiness of the present time. Lord Palmerston once remarked that there are few statesmen who can foresee the consequences of events which have not yet happened; and it may be said of our local authorities that, even when an event has repeatedly occurred during successive centuries, and when it is known that it will continue to occur periodically, they are unable to realize its consequences until they have actually arrived. The vestries might reasonably be puzzled if lava began to flow in Leicester square, or if a glacier were seen descending Ludgate hill; but there can be no excuse for their imbecile unreadiness to deal with such a familiar incident as a fall of snow or an accumulation of mud in moist weather.

It appears that the Parisians have been suffering from a somewhat similar infliction, and have had no difficulty in discovering the reason of it. It is only another of M. Thiers's tricks. That astute and unscrupulous statesman is supposed to have taken advantage of the mud and snow to disparage republican institutions. Under the empire the streets

were kept in good order; and M. Thiers is accused of allowing dirt to remain, in order that a comparison unfavorable to self-government may be drawn between the weakness and incompetence of the radical municipal council and the despotic energy of Baron Haussmann. We have no desire to suggest that similar arts are being practised in our own country; but it is impossible to deny that the appearance of London during the present period has not been altogether to the credit of constitutional freedom. It is possible that things might be better in this respect under an absolute monarchy; but they could hardly be worse under a republic. To keep the streets clean and tidy is not the whole duty of a wise and patriotic government; but it is at least a duty which ought not to be neglected or ignored, and the Parisians are perhaps not far wrong in making it, to a certain extent, a test of the efficiency of their rulers. Good government, it may be urged, should begin at home; it should be apparent in the things which most nearly concern the comfort and decency of a great city, as well as in affairs of greater moment.

If the Parisians are disposed to make well-swept streets a *sine quâ non*, they may perhaps be tempted to return to the empire at once; and under the painful experience of the last few days, it is difficult to repress a wish that, pending the restoration of "the great baron" to the Hôtel de Ville, we might have the loan of him in London for a month or two. The principles of constitutional liberty would no doubt have required that Paris should not even be embellished or purified without its own consent; but, on the other hand, it is hard that the inhabitants of London should be obliged in the name of self-government to submit to the misery and degradation of such a slough of fetid and grimy nastiness as they have lately had to wade through, when they not only pay handsomely for the necessary services, but would gladly pay more if it would ensure the effectual performance of them. It is conceivable that the contractors might resent an increase of remuneration if coupled with a strict obligation to do the work for which they are paid. Those who recollect the excellent condition in which the great thoroughfares of Paris were maintained in Baron Haussmann's time; the relays of sweepers and scavengers who seemed to be always on hand, and who were ready to turn out after a shower at any time of the day; the streams of water flowing down the gutters; the machines with revolving brushes, and the artistic watering of the dusty roads—not with a volley of water from a cart, but with gentle showers from a flexible tube—will admit the superiority of his despotic administration; but it does not follow that equally thorough and well organized work cannot be secured in a free country. There does not appear to be any inseparable connexion between dirty streets and liberty, and it might be possible

to retain all the advantages of our constitution even after judicious arrangements had been made for laying the dust in summer, and clearing away the mud and snow in winter.

It has been pointed out that every householder who does not keep the footway before his house sufficiently swept and cleansed is liable to a fine, and it is the custom to enforce this law in regard to accumulations of snow. It does not appear, however, that it is enforced with any strictness in regard to mud; and however desirable it may be that, in default of adequate public arrangements for keeping the pavement clean, an attempt should be made to compel individuals to discharge their legal obligations, the difficulty of getting the work done in this manner is very apparent. When the mud is at all thick, it requires special tools, which every householder does not possess, in order to remove it expeditiously and thoroughly; and the task is too fatiguing for the women servants who, in probably the majority of London houses, are the only servants available. It would be cheaper and more convenient that the work should be done in a coöperative manner by the local authorities, instead of by separate individuals. It happens that during the time of year when this kind of service is most likely to be required there is always a large body of unemployed men in town, whose ordinary occupations are suspended on account of the weather, or for other reasons, and who are anxious for casual employment, and are glad to accept it at a low price. The demand and the supply correspond in a singularly opportune manner, and it would require only a little foresight and arrangement to make the one answer the other to the satisfaction of all concerned. It cannot be doubted that, if contracts were properly drawn up, and strictly enforced, the contractors would have no difficulty in procuring any number of men that might be required on an emergency.

Penalties are usually prescribed for the non-fulfilment of contracts, but it would appear that they are rarely, if ever, exacted by the local authorities. The difficulty of the case resembles that of the nursery story. There is a stick to beat the dog, but means have to be provided for compelling the application of the stick at the right moment. The recent revolting condition of the streets in the metropolis is only another instance of the unsatisfactory condition of our local government. Mr. Bruce has lately intimated that the government of London is not to be the subject of legislation next session, and as he explained on a former occasion that no attempt could effectually be made to deal with it as long as there was a probability of encountering the opposition of powerful vested interests, it may be assumed that the question is postponed to an indefinite period. It is probable, however, that many, if not all, of the functions of the local authorities throughout the country will fall

within the scope of the sanitary measures which are now under the consideration of the government, and it will scarcely be possible to exclude London from the benefit of the promised reforms. The greater includes the less, and a board which is qualified to cope with cholera and typhus should at least be able to ensure the proper cleansing of the streets.

WEST OF THE MISSISSIPPI IN 1872.

VERY few people in the old States have any just conception of the extent and character of the country beyond the Mississippi; and so different is it from Pennsylvania, New York, Maryland, and Virginia, and even from Ohio and Indiana, that no description can convey to the minds of those who have not seen it a clear conception of it.

Let us first look at it as three great belts—the arable, the pastoral, and the mountainous—the first of which stretches west of the Mississippi to an average width of four hundred miles, and extends from our northern national boundary in latitude 49° to the Gulf of Mexico, a length of not less than one thousand miles. The second, or pastoral, belt is about four hundred miles wide, and as much longer than the arable belt as the gulf coast trends southward at its southern base. The third is that broad and immense range known by the general appellation of the Rocky mountains, not much, if any, less in area than either of the other two great belts.

By far the larger portion of the first or arable belt is made up of rolling prairie, nearly all of which is composed of rich soil of sandy loam, very productive and easily tilled. Veins of limestone crop out over the greater part of it, except on the broad bottom lands which skirt the streams. Some of these bottom lands are prairie, but those along the smaller streams are generally heavily timbered with oak, elm, hickory, walnut, sycamore, and cottonwood, the latter becoming more and more common as we proceed westward. The walnut timber is very abundant and good, and grows to a large size. The oaks are shorter than in the eastern forests. Elms and sycamores grow to a large size, and are much used for rough lumber. The soil of the bottom lands is black and tenacious when wet, but pulverizes easily in cultivation, and is from three to twelve feet thick; that of the high or rolling prairie is from six inches to two feet, resting upon a firm, light-brown subsoil richly impregnated with lime.

A rolling prairie, as seen from an elevated point, is a grand object. Think of a rich undulating meadow or grass field, stretching as far as the vision can carry in this clear atmosphere, swell beyond swell for miles in all directions, without stump or stone, and you may have an idea of by far the larger portion of the arable belt, probably the largest and best compact body of agricultural land on the globe. This belt embraces one-half of Minnesota, the greater part of Dakota, all of Iowa, all of Missouri, one-third of Nebraska, one-half of Kansas, all of Arkansas, more than half of Louisiana, a large portion of Texas, and about half of the Indian Territory—an immense empire in itself, in which one hundred millions of people might find subsistence. In the whole of it there is not a mountain, and but few elevations worthy of the name of hills—only bluffs and swells; and yet there is but little level ground, except the bottom lands. In the north there are some small lakes, but none in the middle or south.

Kansas, which is the geographical centre of our national territory, excluding Alaska, is also the centre, north and south, of this great belt of arable land; and in fertility and climate is probably the most desirable part of it, as its unparalleled progress in population and improvement might lead us to suppose. Its future is bright, although just now its agriculture has got too much in advance of its other industries. There is no native iron in Kansas; but in the south and east there is abundance of coal, so that steam power can be brought into play as well as in Pennsylvania or Ohio. There is no part of the Union where fruits of the temperate zone of every kind can be grown in greater abundance or of better quality than in Kansas, and sheep could be multiplied on these splendid pastures to any extent. So the cultivation and preservation of fruits and the manufacture of woollen fabrics are two industries which could hardly be driven too far in that State.

The second or pastoral belt is more generally known as the Great Plains, a vast tract of land, nearly all of which is fertile enough, and beautifully undulating, but treeless, and exposed to sweeping winds; without a sufficiency of rain for agriculture, but enough to clothe it in a coat of short but exceedingly nutritious grasses, principally buffalo grass. This grass grows only to a height of from three to six inches, and when it dries in the fall remains all winter quite as nutritious as when green; so that animals, whether buffaloes and antelopes, or domestic cattle, keep fat upon it all winter. Sometimes severe storms, with snow, are hard upon unsheltered domestic cattle. The present winter has been especially so; and thousands of animals and a score or two of herdsmen have perished. Even buffaloes, it is said, were frozen to death. But such a season is very unusual, perhaps unprecedented.

In time the business of herding on the plains will become systematized, and some shelter and some provender be provided in good localities, in which cattle can be cared for in such storms. It is at present only beginning, and doubtless the day is not far distant when millions of cattle will supplant the millions of buffalo which now roam over those vast pastures. In riding over the plains in 1868, in the western part of Kansas, we saw hundreds of thousands of buffaloes from the car windows on the Kansas Pacific railway, quietly feeding, yet evidently heading towards the south, for it was in October. It may be that a majority of the vast herd were afraid to cross the railroad, as nine-tenths of them were on the north side. Late in October last, in the same region, we saw one herd of about a thousand, and many scattered ones, sometimes single, and sometimes two to half a dozen together. We saw many antelopes, beautiful and fleet animals, about the weight of deer, but not so tall.

The total absence of trees and houses gives to the great plains an air of desolation; yet the vast distances over which the eye can sweep, the beautiful and delicate grass, the long and graceful swells and depressions of the surface, and the shadows of drifting clouds, when there are any, sweeping over the broad expanse, give to the whole scene a solemn grandeur surpassing anything we ever witnessed. Add to that the fantastic play of the mirage, causing the appearance of beautiful little lakes near the verge of the horizon, the effect of refraction cutting off a strip of sky by lifting the surface of the earth beyond it into view. These illusive appearances are very curious, and sometimes exceedingly beautiful; and although one may know that it is illusory, that no lakes are there, and be able to explain the phenomenon, still it is difficult to resist the belief that we are looking at real bodies of clear, fresh, beautiful water. Sometimes they look as if they were two or three miles long and half a mile wide.

As a pastoral region this immense tract is valuable—less so, to be sure, than an agricultural one, or one stocked with minerals; but in time its meteorological conditions may be so changed by cultivation and tree planting, at first on the borders and gradually extending towards the centre, as to bring the whole of it under the hand of the cultivator. The soil is excellent; all it lacks is sufficiency of moisture. On the borders next the mountains, thousands of acres have already been made productive by irrigation; but as the supply of water that can be obtained from the mountain streams is limited, only a small part of the great plains can be reclaimed by that method.

The Rocky Mountains.—These stupendous mountains, which constitute the third great belt under consideration, stretch almost from the shore

of the Arctic ocean, far up in the British possessions, entirely across our national territory, and terminate in the great table lands of central Mexico. The altitude of the plains along their eastern base ranges from 5,000 to 6,500 feet above the ocean level. From the plains the mountains spring up as boldly and precipitously as if they rose out of the sea. Indeed, the plains do look like an ocean, and the mountain chain like its shore. Hence the view of the mountains, as we approach them, coming over the plains, with their tremendous rocky cliffs and towering snow-clad peaks, is very grand. For a stretch of more than two hundred miles they are in full view; and in that wonderfully transparent atmosphere every prominence, every gorge, every peak, strikes the eye with a distinctness never seen in distant views in the Atlantic States. For example: we look from Denver seventy miles north-west at Long's peak, the summit of which rises about 16,000 feet above tide, and glitters with perpetual snow; yet so near does it look to an unaccustomed eye, that an eastern man would say he could reach it in about an hour and a half with a good horse. Then look south seventy-five miles, and Pike's peak rears its huge summit to an almost equal height, while between these two, and far beyond the first named, the mountain front stands in view without any break.

This great mountain chain is not made up of a single range, but is an aggregation of mountains, range packed against range in wild confusion, generally bearing north and south, but in some places east and west. The width of the chain can hardly be estimated; for in Utah, mountain chains run from it far across the great interior basin. On the eastern front it is well defined; on the west it is not. But the Rocky Mountain chain may be set down at one hundred and fifty miles in width.

Among these ranges there are many depressions—spots much lower than the surrounding peaks, although still from 8,000 to 10,000 feet above tide. Among these there are four, called respectively North, Middle, South, and San Louis Parks. The first three are near the centre of Colorado, north-west, west, and south-west of Denver. The North Park is beautiful and fertile, but rather too cold. Its area is from 700 to 800 square miles. It is surrounded on all sides by lofty ranges, through the north one of which the North Platte cuts its way through a deep cañon. In the ranges surrounding this park there are some gold mines.

Middle Park.—The Middle Park is separated from the North Park by a rugged range of mountains running from east to west, and from the South Park by another. The scenery in this park is grandly beautiful, and the climate delightful; but too cool, owing to its altitude, to ripen wheat, although it grows finely. Potatoes and many of the hardier garden vegetables do well. The park is nearly all a rich prairie, with a

profusion of flowers mingled with the grass, together with strawberries and red raspberries. Beautiful streams of water from the surrounding mountains meander through it, and finally come all together in a considerable river near the south-west corner, where it breaks through the western barrier by a deep cañon. The area of this park is somewhat greater than that of the North Park. The day is not distant when this unique, pretty, and magnificent spot will be the resort of thousands whose health needs recuperating, and of still more who love the sublime in nature. It is somewhat difficult of access. The best pass is about 12,000 feet above tide, through the range which divides it from the South Park, in which Bayard Taylor encountered heavy masses of snow in July. But a narrow-gauge railway will be carried through before long. In this park there are fine hot and medicinal springs, and abundance of trout in the streams—healing for the sick, and sport and good eating for the healthy. There are no permanent settlers yet in the Middle Park, and not much has been done in the mines.

South Park.—Of these three neighboring parks this is the best, most accessible, and the richest in mines and pastures. The other two are nearly quadrangular; this one has more the shape of a horse-shoe. It is settling rapidly, for it is considered the best region for dairies in all that country, and farming can be prosecuted to advantage by adapting the crops to the altitude—from 8,000 to 10,000 feet above tide. This park is drained by the South Platte, which breaks through the mountain barrier by a cañon on the eastern side. Fountain creek, a tributary of the Arkansas, breaks through the southern barrier, near Pike's peak, reaching the plains at Colorado Springs.

It is worthy of remark that while the water of the North and the South Parks is drained into the Platte by its two great upper branches, and thence flows to the Atlantic through the Gulf of Mexico, that of the Middle Park, which lies in a direct line with them, flows westward to the Pacific through the Colorado river and the Gulf of California. At that point the water-shed of the continent is in full view from Denver, and not far away. Long's peak sheds its water into both oceans.

San Louis Park.—This largest and most southern of the great parks has an area equal to all the other three. The line dividing Colorado from New Mexico crosses it at about the middle of its length. The Rio Grande river enters it from the west through the mountain which bounds it on that side, and after a southern course of nearly a hundred miles through it, passes out at the southern extremity of the park through a cañon. Near the centre, some miles north-east of where the river enters, there is a considerable lake without an outlet, which rises with the melting of the snow on the surrounding mountains, and sinks after the

flow from that cause abates. This is a beautiful park and very valuable, as its southern latitude gives it a fine climate. The soil is rich, the centre is a grassy prairie, while the mountain slopes all around are timbered. The mountains on every side, with numerous snow-clad peaks, tower up grandly and in full view from every part of the open park. It is possible that the Denver and Rio Grande railway may run through this park, and thence down the river to its ultimate destination.

There are many, perhaps hundreds, of smaller parks scattered among these multitudinous mountains, some of considerable size, others comprising but a few hundred acres. In some of them there are beautiful little lakes. It follows, therefore, that this stupendous chain is by no means an inhospitable, uninhabitable region; nor is it impracticable to run railways through the passes, gorges, cañons, and parks, so as to render the whole alpine region accessible, and bring to light its yet unknown wealth in gold and silver. This seems to be the great treasure-house of the Almighty, shut up with bolts and bars so tremendous that nothing short of the capital, science, skill, and combined energy of the present generation were able to remove them. There is practically no limit to these treasures; yet so stubborn are the ores in which they are hidden, that the business of bringing them into conditions fit for commerce and the arts is but fairly remunerative. Science guided by experience, and improving facilities of transportation, however, are steadily overcoming these natural difficulties; and the time is near when this vast mountain region will be the theatre of one of our greatest productive industries. The need of gold and silver by the entire civilized world is rapidly increasing, and here, probably, is its chief supply.

But gold and silver is not all. All along the eastern base of this great chain, from Montana far down into New Mexico, there are immense deposits of coal and iron ore. These, after all, are the substratum of solid wealth and progress. Some of the veins of coal are twelve to fourteen feet in thickness. Most of it may be classed with the bituminous; but strictly speaking, it is not. It seems to possess the qualities of both bituminous coal and lignite. It is rich in gas, and gives off a bright flame, but not a very dense smoke. When the volatile matter is exhausted the fixed carbon looks like burning charcoal, and some of the more northern varieties send off more and brighter sparks than any charcoal. The steam generating quality is very good. The coal found in the southern part of Colorado can be coked; that found near and north of Denver cannot. In New Mexico, southwest of Santa Fé, there is a field of anthracite coal, which cannot be distinguished by the eye from the anthracite of Pennsylvania; but its extent has not been ascertained.

Near where the Arkansas river leaves the mountain and begins its

long course across the plains, there is a mountain of iron ore said to be greater in magnitude than the Iron Mountain of Missouri, and quite equal to it in quality. In appearance and specific gravity the two ores are very similar. But iron ores are co-extensive with the coal.

Copper and lead mines are found among these mountains in many places; but probably the copper ores of New Mexico are the richest and most abundant. Some placer gold is found in gulches, but not much compared with the rich placers so largely worked in the early days of California; but veins of gold-bearing quartz, more or less rich, exist in great numbers throughout the entire region. The production of silver is at present increasing more rapidly than that of any other metal, and is the most remunerative; yet it is probable that the manufacture of iron, when it is entered upon, will be still more remunerative. From what we know of the vast deposits of coal and iron ore, we are inclined to give to the iron the first place among the mineral resources of this extensive mountain region. The second place may be given to silver; the third to gold; the fourth to copper; and the fifth to lead.

The climate of this immense alpine region is among the most salubrious and delightful in the world; for, although the lofty peaks bear more or less perpetual snow, the valleys are well fitted for human habitation, and are already filling up with people, chiefly those connected with the mines. Along the eastern base, although from 5,000 to 7,000 feet above tide, the temperature is even milder than in corresponding latitudes east of the Mississippi. This can only be accounted for from the great extent of that elevated region. From the Missouri, between Omaha and Kansas City, the ascent westward to the base of the mountains averages ten feet per mile. At the western border of Kansas the altitude of the plains is a little over 3,000 feet. Denver is 5,200 feet above tide; Cheyenne a little more; while Colorado springs, seventy-six miles south of Denver, are a little more than 6,000 feet—about twice the height of the Allegheny mountains in Pennsylvania, and but little less than that of Mount Washington. The great central basin beyond the Rocky mountains has about the same altitude. Nearly one-third of this continent, therefore, lies a mile or more above the ocean level. The climatic effect of this altitude is not the same as that of a local and limited elevation, but is more of the nature of a mere enlargement of the planet. Valleys 6,000 feet above tide are as warm as those in the eastern States in corresponding latitudes which have not one-tenth of their altitude.

While the temperature is but little affected by the elevation of this immense tract, in the midst of which these mountains rear their lofty and rugged ranges and peaks, the atmosphere is affected barometrically

just as much as if the altitude was that of a single peak. Hence its unsurpassed purity and clearness, enabling us to view scenery more than two hundred miles distant with a distinctness hardly ever attainable at one-tenth of that distance in the eastern States. Distant objects look near. Some years ago, when parties rushed to the mountains around Pike's peak, in the hope of finding mines of gold, a party wearily making their way over the plains at length came in sight of that famous mount, and pressed forward to reach its base before night. But it required not only that day, but two more days of hard travelling to reach it. No eastern man can judge of distances out there. An eastern gentleman, while in Denver, took a fancy to walk across to the base of the mountains and back before breakfast. They were in plain view and looked near; but he gave it up, for the distance across the intervening plain is twelve miles.

It is not so difficult as might be supposed to carry railways into and over these stupendous mountains; for the gradual upward slope of the plains lifts them to more than half their utmost elevation. The difficulty lies more in the extreme narrowness and sinuosity of the cañons through which ingress to the interior valleys and parks can be obtained. But with the narrow gauge it can be and has been done; and the day is not distant when the whistle of the locomotive will blend with the clatter of the miner's pick among these labyrinthian peaks and parks, and coves and cañons, where incalculable wealth is hidden.

This mountain district, regarded until very recently as a great bar to human progress, is likely to become the seat of more varied industries, the home of a more energetic people, and the theatre of a higher development of both material and intellectual forces, than the world has hitherto seen. Its salubrious, bracing atmosphere, its unsurpassed grandeur, its unique beauty, its inexhaustible mines, render it attractive; while its very difficulties will call forth the highest skill and energy of man, and thus conduce to its ultimate greatness. It is likely to become what Bishop Berkeley speaks of as "Time's last and noblest offspring." Certainly the subjugation of that sublime, rugged, rock-ribbed region is the hardest task to which human energy has yet addressed itself; but its hidden treasures will richly compensate the laborers in this field.

Such is the empire which lies beyond the Mississippi, and on this side of the central basin and the Pacific slope. First, the immense undulating prairie region, where food for a world may be grown. Then the great plains, beautiful even in their desolation, and which will soon be the pasture grounds of flocks and herds innumerable, as they have for ages fed millions upon millions of buffaloes and antelopes. And

third the mountains, with their vast and varied treasures, and so grandly beautiful. All this may be regarded as the Central Region of this continent; and the day is coming when its people will control the destinies and dictate the policy of this great empire. We see its infancy. Our children—not our children's children—will see it developed to manhood, for things are moving very rapidly. Railways cause human progress to go on with railway speed; while the telegraph makes a domain of a million square miles as one city.

In all this great territory there are, it may with truth be said, no navigable rivers—for the Missouri, with all its length and volume of water, is hardly navigable. In it the railroad is the sole means of social and commercial communication. Here the locomotive must and does precede the plow, and civilization in all its completeness goes forward at once; so that we find in Kansas and Colorado as full a measure of the comforts and refinements of life as in Massachusetts. No frontier life in the world was ever like it; and this is the result of those agents of power—the railway and the telegraph. A man or woman from New England, or any of the Atlantic States, don't feel that he or she is far from the old home; nor is he; for he may send a message back in less than an hour, or be there himself, if he chooses, in two or three days. Here his daily morning paper, though printed under the shadow of the Rocky mountains, gives him the news from all parts of the world just as early as his fellow-citizen of New York or Philadelphia reads it, and almost as fully; while amid the broad prairies of Kansas and Nebraska he can, if he sees proper, regale himself on good oysters taken from the shell at the time.

Well may the question come home to the statesman, to the christian, and to the philanthropist, in view of this magnificent and varied region in which population is growing with unexampled rapidity, "What are we going to do about it?" This, certainly is a field in which to sow good seed with an unsparing hand. It is a noble work to develop, by the outlay of capital, such a country; but nobler still to exert upon it such influences as shall cause these vast communities, now in a formative state, to crystallize aright, to the glory of our country and our God.

ILLUSIONS OF THE SENSES.

ON the 28th of February, 1799, Herr Nicolai, a member of the Royal Society of Berlin, read before that association a memoir on a complaint with which he had been affected about eight years before, the

most singular feature of which was the appearance of various spectres. On the morning of February 24, 1791, he was in a violent perturbation of mind, owing to a series of disagreeable incidents, which, he says, had deeply wounded his moral feelings, and from which he saw no possibility of relief. His wife and another person came to console him; and, while they were with him, he suddenly observed at the distance of ten paces the figure of a deceased person whom he had formerly known. He pointed to it, and asked his wife if she saw it. She was alarmed at the question, and sent for the family physician. After a stay of seven or eight minutes the apparition disappeared. In the afternoon, however, it returned, and haunted him at intervals through the rest of the day, following him from room to room. A little after six o'clock several other figures appeared, stalking about, apparently not in any way connected with the first. Phantoms of this sort continued to haunt him for nearly two months, the forms being sometimes those of deceased or living persons known to him, but more frequently such as he could not remember having ever seen before.

Though perfectly convinced that they were but creatures of his own imagination, Herr Nicolai, in the excited state of his nerves, could not at first free himself from an emotion of terror; but he afterward regained his composure of mind, and observed them closely, with a view of discovering some law of association in accordance with which they might be found to present themselves. He could trace no connection, however, between them and any of his thoughts, or his employment, or any object of his attention. They were not at all under the control of his will: he could not produce the appearance of persons of his acquaintance, though he would form as lively mental pictures as possible of them, sometimes even of some who had unexpectedly presented themselves a few hours before.

They appeared to him at all times, by day or by night, whether he was alone or in company, at home or abroad; and seemed, he says, as distinct and clear as real persons would seem in the same positions. Yet he informs us that he was always able to distinguish his phantoms from realities, and thinks that the colors of their clothes and tints of the uncovered parts of the body were somewhat paler than they are in nature. They commonly passed to and fro as if they had no connection with each other, but sometimes they appeared to transact business together. Once or twice, persons on horseback and dogs and birds presented themselves. About four weeks after their first appearance they began to speak, sometimes with one another, but for the most part to Herr Nicolai himself, endeavoring to console him in his grief, which still left deep traces in his mind. He sometimes heard them speaking

when he was in company with real persons, either joining in the conversation or making irrelevant remarks.

These phantasms continually increased in number, and Herr Nicolai became so familiar with them that they did not cause the least disagreeable emotion, but on the contrary frequently excited a great deal of interest and even amusement. Still, as they began to haunt him for whole days together, and even during the night whenever he was awake, he determined to try leeching, a remedy which had relieved him some time before when much troubled by a congestion in the head. Accordingly, on the morning of the 20th of April, the leeches were applied. During the operation the room swarmed with human forms of every description, which crowded fast on one another. This continued for more than five hours, when he observed that the figures began to move more slowly, and soon afterwards the colors grew gradually paler. In two hours more they became, he says, perfectly white and moved very little, the forms, however, remaining distinct. In another hour they had become almost invisible, only some pieces remaining, which also by degrees were lost to the eye.

We have cited this case as perhaps the most accurately described instance of hallucination on record, with a view of illustrating some features of unconscious mental action, and the nature of some nervous operations little understood. To do so, it will be necessary to consider in connection the simplest kind of illusions of the senses, such, for instance, as the appearance of a fiery circle when a living coal is whirled round, and the persistence of a dark round spot in the field of vision for some time after we have been gazing at the sun. These phenomena are generally thought to be due to the continuance of the impression on the retina of the eye. Sir Isaac Newton, indeed, maintained the contrary, and tried a simple experiment to prove it. He looked at the sun with the right eye, the left being covered; then, covering the right, and looking with the left on a white ground, a spectrum of the sun was seen there. This experiment at first seems decisive, as the impression on the retina could not change from the right eye to the left. It seems to demonstrate that the spectrum is not caused by any affection of the optic nerve of either eye so long as it remains separate from the other. On reflection, however, we suspect that an illusion of a different kind may be concealed here. The fields of vision of the two eyes have become so united by habit that it is very difficult to separate them in perception. If we cover one eye with green glass, and then look with both eyes at a landscape, we do not see one view in its natural colors and another tinted green; we see but a single view with a sort of greenish veil over it. So, if we look at a landscape with one eye shut, it seems

a little darker than if both eyes were open: the darkness which constitutes the field of vision of the shut eye unites with the field of vision of the open eye and dims it. If at such a time the spectrum of the sun were on the field of vision of the shut eye, it would present the effect which Sir Isaac Newton observed. The stereoscope shows how naturally we unite the views of the two eyes, even when they are artificially separated. An instructive experiment to show how difficult it is to discriminate between them is the following: Roll up a piece of stiff paper into a tube about six inches long and of sufficient diameter to fit round the eye. Look through it with one eye, and hold a book against the side of it opposite the other eye. Keep both eyes open, and there will seem to be a hole in the book, through which objects will appear. These objects are, of course, really seen by the eye that looks through the tube, but they will appear to be seen by the other eye through the book.

However the question may be settled as to the part of the nervous system which is affected when such simple illusions of the senses are produced, there can be no doubt that in such complex hallucinations as those of Herr Nicolai the affection is principally in one of the nervous centres—the cerebrum, the cerebellum, or the medulla oblongata. We know that in order to perceive external objects it is necessary that they should cause some change in a nervous centre. Of the nature of this change we know nothing: there is no reason to suppose that it bears any resemblance to the impression on the external organ of sense. That a change in the nervous centres is sufficient, is proved by such facts as the well-known cases in which a leg has been taken off, and yet the patient through the rest of his life has felt at intervals pain or itching in the absent foot. Cases have also been recorded in which blind persons, persons with the optic nerve atrophied, have yet been in constant habit of seeing figures apparently as real as those of Herr Nicolai. Now, nothing is known to favor the view that the innumerable images formed on the retina during a man's life are stored up anywhere like pictures in a gallery. But there is some change in the nervous centres, of which we know nothing, save that it is marvellously persistent and can reproduce, after the lapse of years, what seems a *facsimile* of the external conditions in which it originated. Indeed, there is reason to suppose that it is never altogether effaced. Under peculiar conditions persons have recalled to memory occurrences which they had lost sight of for the greater part of a lifetime. For example, Dr. Abercrombie mentions the case of a man who fell in a stupor in consequence of an injury of the head. On his partial recovery he spoke a language which nobody about him understood, but which was soon ascertained to be Welsh. It was then discovered that he had been thirty years absent from Wales, and

before the accident had entirely forgotten his native language. On his perfect recovery he completely forgot his Welsh again, and recovered his English. Similar instances are common; and it is well known that persons saved from drowning have averred that in the moment of danger the whole of their past lives seemed to rise up before them.

It is to such reproductions of past experience, or to combinations of them, that the name *ideas* is commonly given. In the normal state they are strikingly distinguished from real objects by their faint and shadowy character. In other respects there is little distinction. We think of a friend just as we see him; our idea of him includes his peculiarities of feature, gait, dress, &c. Our idea of the starry heavens is a dim and indefinite reproduction of the views we have taken of them. They appear just as vast and as distant in thought as in reality. There is reason to believe, however, that the ideas of children are far more vivid than those of adults. We know of a little boy eight years old who was present when his father was describing the picture in Lear's Book of Nonsense, of the old man in a tree, who was horribly bored by a bee. After the description was finished the boy told his father that he had forgotten to mention that the bee had a pipe in his mouth. The father replied that he thought not. "O, yes it has," said the boy, "for I see it. I see it before me just as plain as if it was really here." On reference to the book he was found to be right. We have frequently known children to confuse their ideas with actual perceptions, and seem unable to believe that they had not really seen what they had only imagined. Dr. Maudsley thinks it probable "that temporary or fugitive hallucinations are not uncommon in infancy, and that the child stretching out its hand and appearing to grasp at some imaginary object is deceived by a subjective sensation."

Of course, all the senses are subject to illusions. Those of sight and hearing are most common; but others frequently occur. Many insane persons continually imagine themselves to be inhaling sweet perfumes or tasting rare viands; many others are made miserable by disgusting odors or the taste of filth and refuse. Dr. Brierre de Boismont tells us of one of his patients who for years continually licked the walls of his room, alleging that they were delicious oranges. As to the touch, there are numerous cases of persons who suppose themselves pinched, pricked, or struck. The witchcraft delusions afford instructive instances of this kind. M. Baillarger mentions a woman on whose head a flower-pot fell, and who directly afterwards heard the noise it made in being shattered on the pavement. Subsequently, twenty times a day, she felt the same blow and heard the same sound. The sense of heat may be equally disordered. Dr. Abercrombie narrates the case of a gentleman who

after a paralytic attack felt cool bodies as hot. When he put on his shoes they seemed to burn him; after they had been on a while they seemed to cool. With the muscular sense the case is the same. Baron von Feuchtersleben relates an experience of his own when his fingers felt as if swollen, requiring considerable exertion to move them. In dreams, which are hallucinations, we often seem to be moving about, and St. Jerome tells us that frequently in his dreams he felt himself flying over mountains, seas, &c. Dr. de Boismont, before quoted, refers to a literary man of his acquaintance whom he several times found with fixed eyes, and who said, "I am flying; do not stop me." On returning to himself it seemed to him that he had really flown.

It is important in a philosophical point of view to recognize the element of judgment which all illusions of the senses involve. "The senses do not deceive us at all," says Kant; "it is only the judgment which deceives us." A natural remark to come from a man who had dealt so much in abstractions that he had come to conceive them as individual entities—to regard the judgment, for instance, as a mysterious being distinct from the man himself, and at times unaccountably seeking to deceive him. An equally metaphysical objector might say that it is not the man, but the judgment, which is deceived. We consider it less exceptionable to say that in every illusion there is necessarily a misjudgment of some kind and degree. Those who quote Kant's remark with approval generally do so to discredit the phrase "illusions of the senses," which, we hold, has a useful and recognized meaning, whatever it be that deceives.

In thus representing misjudgment as an invariable concomitant of all kinds of illusions, we do not mean to deny that the subjects of them are often fully aware of their real nature. Herr Nicolai was perfectly so. What may be called *the* judgment which we form respecting them may be the correct one; yet we maintain that from their very nature they involve something essentially the same as an erroneous judgment. The explanation of this statement lies perhaps in the plurality of our nervous centres. The medulla oblongata, or the cerebellum, or the optic thalami, may be the seat of an illusion, of which the cerebrum may judge correctly. Dr. Wigan refers to cases of hallucination to support his theory of the *duality* of the mind; we are here explaining them by the doctrine of its *plurality*. That the mind is capable of attending to several things at the same time is obvious. As we walk along the street, every motion requires a nice adjustment of the muscles suggested by the feelings accompanying the previous step. Yet all these adjustments are made unconsciously by the action of the lower centres, and we may become so deeply engrossed in conversation as not to know that we are walking.

And further, while walking and conversing, we may minutely notice numerous things around us. It is an important part of the conjurer's art to be able to do several things at once. Robert-Houdin tells us that he trained himself to be able to keep four balls flying in the air at the same time that he was reading a book with attention. His admirable performances of "second sight" depended largely on his own ability and that of his son to notice an almost incredible number of things, and communicate their knowledge to each other while all observers seemed to see them fully engaged. This ability was acquired by long practice. The doctrine of the separate action of the nervous centres is now a recognized fact in mental physiology, and we need do nothing more than refer to the writings of Drs. Carpenter, Laycock, and Maudsley, for abundance of evidence of its truth.

It may be asked, however, granting all the functions claimed for the medulla oblongata, the cerebellum, and perhaps other nervous centres, as well as the cerebral hemispheres, where is the evidence that there is anything like *judgment* exercised in illusions of the senses. Herr Nicolai saw his spectres, but his judgment was sound. We have said that the nature of illusions involves what is essentially a judgment, and we will endeavor to make our meaning clear. Illusions of sight, for example, always seem to be in some *place*; indeed, in all illusions the element of place enters. Now a knowledge of place—that is, an idea of place—can be obtained only by a comparison of many sensible experiences. We look at two trees, and one seems twice as far off as the other. The perception of this is instantaneous; we do not analyze its steps; they do not rise into consciousness. Yet nothing is more certain than that this seeming immediate perception is in reality an inference, a judgment. Nothing is presented to the eye but a variously colored surface, which may be copied on canvas. All that the eye sees may be reproduced on canvas, but the distance from the eye cannot be. Our apparent perception of the *size* of any object is also necessarily an inference from our previous experiences combined with a judgment of its distance. Sometimes we may make erroneous inferences of this kind, and afterwards correct them by the aid of better observations. In the case of the moon, for example, our childish judgment of its size is likely to be that it is about as large as a dinner-plate. As we grow up, a wider observation enables us to correct such a gross error by correcting our former estimate of its distance, and hence inferring a larger size. The childish estimate, however, has fixed itself in the mind, and is naturally formed as soon as the moon is seen; so that even an astronomer familiar with the moon's actual size, and able by an effort to see it as a very large globe, nevertheless sees it first as he did in childhood. His early judg-

ment has become by habit an integral part of the act of perception; his later one is much less vivid. That an estimate of distance is absolutely necessary to a judgment of size is evident from the fact that the amount of visual space covered by a given object is altogether dependent on its distance from the eye, so that a small near object may produce precisely the same effect on the retina as a large distant one. This is well illustrated in Edgar A. Poe's admirable story of *The Sphinx*, which also shows how the same principle holds in hearing. He sees from the window, on the side of a distant hill, an immense monster larger than any ship of the line in existence. Its mouth is situated at the extremity of a proboscis some sixty or seventy feet in length, and about as thick as the body of an elephant. Near the root of this trunk is an immense quantity of black shaggy hair. There are two gigantic projections parallel with the proboscis, one on each side of it: they seem prisms of pure crystal, and reflect in a gorgeous manner the rays of the declining sun. It has wings apparently two or three hundred feet long, covered with metallic scales that seem ten or twelve feet in diameter. On its dark breast a *Death's Head* is accurately traced in glaring white. While he regards it with horror, it suddenly emits a sound so loud and so expressive of woe that he falls fainting to the floor. This finally turns out to be a moth called the *Death's-headed Sphinx*, wriggling along the window near the observer's eye. Now this estimate of size founded on a previous estimate of distance, this unconscious judgment, may be performed by other nervous centres than the cerebrum: of this there is experimental evidence. And as all illusions of the senses involve such estimates, we may affirm that to some parts of the nervous system they are real, though the sane mind corrects them by a comparison with external things. The madman adds to his partial error the more formal and definite assent of his higher mental powers.

We know much less than we think we know of our mental acts. M. Taine, in his recent work on the *Intelligence*, argues that in every perception of the senses we see or feel but a small part of what we seem to see or feel, the mind supplying all the rest. Every perception, he says, involves a true hallucination. In a similar spirit the Hindoos call all nature *Maya* or illusion. The celebrated physiologist Müller says that he is satisfied that many persons would perceive spectral illusions if they learned how to observe their own sensations. A good illustration of the nature of unconscious mental action seems to us to be afforded in the case of a young lady of Philadelphia recently attacked by small-pox. On the first night of her illness, and before its nature was suspected, she saw a host of goblins dancing around her bed, pointing at her with their fingers, and shouting "*Small-pox! Small-pox!*" Her

eyes were open at the time. Of course, the thought of the disease being small-pox must have troubled her mind, though she was entirely unconscious of it, and it was only manifested in this abnormal way. Our experience with persons in whose hands a "planchette" writes answers to various questions, has convinced us that they may be unconscious both of the thoughts which they write and of the fact that they set the instrument in motion. The trance state of the persons known as "mediums" is also frequently an unconscious one.

Closely connected with the consciousness of mental phenomena is their control by the will. In general, hallucinations are not subject to the will, as normal ideas are; but at times they are so. Goethe could call up an image at will, and make it change before his eyes. The painter Blake had the same power. "You have only to work up imagination to the state of vision," said he, "and the thing is done." The celebrated Talma confided to a friend that when he trod the stage he could, by the mere force of his will, make all the brilliant dresses of his numerous audience disappear, and substitute skeletons for the living beings. The sight so wrought up his emotions as to produce the most striking effects in his acting. A similar power was possessed by a Dr. Anderson, of Cobham, except that his will was not necessary to produce the effect, though by a strong effort he could prevent it. When he was in a ball-room, for instance, "his imagination gradually and slowly went on removing one article of clothing after another from all the persons present, then their integuments, then layer after layer of muscles, then removed the viscera, &c.; at last left them all bare skeletons dancing before his eyes, and he burst into loud laughter at the ridiculous scene." Disease of one cerebral hemisphere was discovered after his death. Dr. Wigan, from whose interesting work on the Duality of the Mind the foregoing narrative is extracted, gives also an account of a celebrated English portrait painter, who became exceedingly popular because he required but one sitting. He said, long afterwards: "When a sitter came, I looked at him attentively for half an hour, sketching from time to time on the canvas. I wanted no more; I put away my canvas, and took another sitter. When I wished to resume my first portrait, *I took the man and set him in the chair*, where I saw him as distinctly as if he had been before me in his own proper person—I may almost say more vividly. I looked from time to time at the imaginary figure, then worked with my pencil, then referred to the countenance, and so on, just as I should have done had the sitter been there: *when I looked at the chair I saw the man!*" * * * * *

* * * * * Gradually I began to lose the distinction between the imaginary figure and the real person, and sometimes disputed with

sitters that they had been with me the day before. At last I was sure of it; and then—and then—all is confusion—I suppose they took alarm. I recollect nothing more—I lost my senses—was thirty years in a mad-house.”

The essentially diseased and dangerous character of hallucinations is shown by the instances referred to. In Herr Nicolai's case they were due to congestion. So, Mr. Dendy tells us of a man who saw a spectre whenever he lay down, but which vanished as soon as he sat up in bed. We may mention by the way that an increased flow of blood to the head often powerfully stimulates the imagination of writers. Sir Walter Scott said that he conceived his best thoughts in bed. The engineer Brindley was accustomed to retire to bed *for a day or two* when reflecting on a scientific project. Several other such instances have been recorded, and may serve partially to explain why ghosts are so frequently seen by persons in bed. Fever, congestion, in short a host of diseases, produce illusions. The young lady whom we have mentioned as having the small-pox saw spectres of various kinds during the progress of her disease. At one time she saw by her bedside the family physician about to vaccinate her aunt, neither of them being really in the room at the time. Instead of performing the operation of vaccination, however, he took a razor and cut her aunt's arm into small pieces. This appeared perfectly real, and only the absurdity of the thing taught her that it was an illusion.

Instances of the progress of these abnormal phenomena to insanity should teach caution to those who encourage the development in themselves of such abnormal states as the mesmeric sleep, or the trance of mediumship. When the subject has once yielded to the power of the hallucination his conviction of its reality extends itself, and is likely in time to overmaster the whole mind, so that states at first compatible with the free exercise of reason end in confirmed madness.

THE INDUSTRIAL USES OF FATS.

THE homely objects—soaps and candles—so useful in domestic economy, and so indispensable to the comfort and convenience of all civilized communities, by their very familiarity seem to repel the idea that their manufacture demands attention to scientific principles. The fact that their abundance and cheapness is greatly due to the labors of distinguished chemists who have investigated the nature of the raw

materials entering into their composition, and who by means of these investigations have simplified the art and improved the products, is frequently overlooked. The business of the tallow chandler and soap boiler, however humble may have been its origin, and which was formerly governed by rude empirical rules, has, under the fostering care of science, emerged from a mere routine of drudgery, and is now recognized as a chemical art of no small importance. That the business is, to some extent, still prosecuted by persons ignorant almost of the very existence of chemical reactions, is a matter that cannot be denied: but no fact is more clearly evident than that this branch of industry has assumed a character and an importance which entitles it to be classed among those avocations which demand a liberal knowledge of the principles which underlie the routine of manufacturing operations. To draw an illustration from another and a very different art—the unlettered Hindoo with his rude forge will produce iron and steel of excellent quality from the ore. He requires no acquaintance with chemistry—no theoretical knowledge of the reactions which result from his toil; and owing to the peculiar relations of labor, fuel, and ore, it is to him a matter of very little moment how much of these items may be expended in producing a certain result. He simply plods on after the manner of his predecessors, content with merely accomplishing what they have done before him. But when the manufacture of iron is undertaken in countries where economy is a subject of paramount importance, and where competition offers an additional stimulus, a host of collateral questions are suggested; and it becomes an affair of great consequence to produce the largest possible quantity with the least possible expenditure. To accomplish this result the theory of the art must be well understood, and an intelligent comprehension of the process be entertained; or, in other words, the application of science must be invoked. This fact is no less true of nearly every other branch of manufacturing industry; and it affords a gratifying example of an increased appreciation of a technology founded upon correct principles. The manufacturer who converts the crude fats and grease of commerce into superior products—soap and candles, for instance—recognizes the obligations under which science has placed him, and, directly or indirectly, is often obliged to consult authorities to aid him in his vocation.

Under the generic term, fats, are included all those substances of an oleaginous or greasy nature, which are derived from the animal and vegetable kingdoms. A wide acceptance of this term might also embrace the more delicate and volatile oils of vegetable origin, which are known as the essential oils. But as the uses of these are limited in comparison with the fixed oils and other fats, we omit them from

consideration, and for the present will merely refer to the commoner varieties of oleaginous bodies, which form important objects of manufacture and commerce.

The fats of animal origin present a great variety of forms. From the suet and tallow of the herbivora, which are comparatively hard and firm, it becomes softer in birds, and is found nearly or quite fluid in fishes, as is exemplified in the oils, such as whale, train, seal, and others. These different degrees of consistency determine, in a great measure, the uses of each particular kind of fat—the harder varieties only being employed in the manufacture of candles, and those of the next grade in soaps; while the oils proper find a variety of uses which render them valuable in the arts.

Prominent among the fats of vegetable origin, palm, olive, cocoa-nut, almond, rape, linseed, and a few other oils are important articles of trade. The former three varieties are largely used—palm oil being a prominent raw material for candles as well as for soap, while olive oil is largely consumed in the fabrication of castile soap. In the genuine soap of that name it is the chief fat stock used. It possesses peculiar emollient powers as well as a high grade of detergency, and hence is admirably fitted for the preparation of fine toilet soaps. The uses of linseed oil as a vehicle for paints, and as a component of varnishes, &c., are well known.

Among the earliest applications of fats to the demands of domestic economy was undoubtedly that of affording artificial light. Lamps have been used from remote antiquity. They are frequently mentioned in the scriptures, and it is generally believed that they were first employed by the Egyptians. The ancient Greeks were accustomed to their use long before their adoption by the Romans. It is probable that the earliest lamps were vessels of a saucer shape filled with oil, in which was placed a bundle of rushes or dried moss to serve the purpose of a wick. With the advance of civilization these rude forms gave place to vessels of more convenient and elegant shape; as, among the most highly prized specimens of ancient art, the museums of Europe contain many samples of lamps—those from Herculaneum and Pompeii being especially valued for the grace and beauty of their design. But however symmetrical may have been the contour of these vessels, they must have formed very indifferent sources of light—either giving a very dim or a very smoky flame.

Candles have been used as illuminating agents for many centuries. They are likewise referred to in the scriptures, and in the writings of ancient authors; some of them prior to the Christian era. But it is more than likely that the candles thus alluded to were merely rushes or

strings of flax coated with a mixture of pitch and wax; for the true candle, consisting of a wick surrounded with wax or tallow, is of much more modern date. Eusebius states that in the fourth century the city of Constantinople was illuminated on Easter eve by order of the emperor Constantine, by means of lamps and wax candles. Candles made of wax were used by the higher classes during the middle ages. These were formed by dipping wicks of twisted tow in melted wax, and varied much in size, some of them being fifty pounds in weight. Fosbrook says that these candles were sometimes cast in moulds called *longitudines*. Some time subsequent to this the harder portions of animal fats were employed in the manufacture of candles, since which time their use gradually extended. Under the the various forms of rush lights, dips, and mould candles, they have been employed in almost all parts of the world; although recent improvements based upon the important discoveries of Chevreul have offered a far better, more cleanly, and in every way a more efficient substitute.

The fat which furnishes the tallow of commerce is chiefly obtained from neat cattle and sheep. It is that which is located under the skin, about the intestines, in the bones and muscles, and in the vicinity of the kidneys. The food and age of the animal determine to a certain extent the value of the tallow it will yield. Cattle in the prime of life, fed on dry fodder, produce the highest grades of the fat. The great superiority of Russian tallow consists in the fact that for eight months dry fodder is almost the sole article of diet the animal receives. The crude fat as it is obtained from the butcher is contained within a skin-like tissue, the membranous walls of which form minute cells, each enclosing globules of fat. In order to unite these globules into a homogeneous mass, and to free them from the tissue which would otherwise rapidly putrefy and injure the quality of the tallow, the crude fat is subjected to the operation of rendering, which consists in submitting it to a melting process, either by the agency of direct fire or by steam. In this operation the cells are burst assunder by the expansion of their contents, and a milky emulsion is formed, caused by the mechanical mixture of the fat with the water which likewise exists in the cells. By the prolonged action of the fire the water evaporates, and the particles of tissue assume a hard and somewhat crisp appearance. The fluid fat is then strained off, and the residue pressed into cakes, in order to squeeze out as much of the grease as possible. The blocks are sold in the market as "cracklings."

Improvements in the mode of rendering tallow have been introduced from time to time, by which a product of better quality is obtained. The process of D'Arcet, in which dilute sulphuric acid is employed to effect

the dismemberment of the tissues, is used to a great extent in Europe, and effects a more thorough purification of the fat than when heat alone is employed, making it harder and firmer, and much better adapted to the manufacture of candles.

These familiar objects are prepared by simply melting the tallow, which is poured into cylindrical or slightly conical moulds, through the centre of which the wick, consisting of cotton fibre, is stretched. On cooling, the candles are withdrawn from the moulds, when they are assorted and packed for sale. Even when made of the finest and best grades of tallow, these candles are objectionable on several accounts. Their greasy feel and low melting point, their disposition to "gutter" when burning, and the necessity for constant snuffing, are qualities which assign to them an inferior place among other illuminating agents. Attempts have been made to improve the character of tallow candles by coating their exterior with a harder substance, so as to enable them to retain their firmness in warm climates, but with little or no success. But what it has been found impracticable to do by mechanical means, has been accomplished by the aid of chemical science; and it was reserved for the genius of Chevreul, not indeed to improve the quality of crude or refined tallow, but to determine its proximate constituents, and to devise methods for separating them from each other; and furthermore, as a result of his labors, to open up a wide field for the employment of other fat stock, the uses of which had hitherto been restricted.

This distinguished chemist—the pupil and successor of the celebrated Vauquelin—commenced his investigations in the early part of the present century, but did not announce their entire results until 1823, at which time they were published. At this date the department of organic chemistry was in its infancy, and consequently the labors of Chevreul deserve a much more grateful recognition than if that branch of the science were as well explored as it has been in the interval. His investigations were characterized by an originality which entitles them to be considered among the most remarkable researches on record; and so important have been their practical results that in 1852 he received a prize of twelve thousand francs from the Society for the Encouragement of Useful Inventions, as a reward for his work on the Chemistry of Fatty Substances, published nearly thirty years previously.

Prior to the researches of Chevreul, fats were considered to be simple organic bodies; and hence, while this erroneous impression prevailed, there was but little hope of any decided improvement in the methods of utilizing them in the arts. But when their true character was revealed, it was perceived that a new branch of industry of momentous proportions had been created, requiring an immense capital, and giving

employment to thousands of workmen, besides elevating the business of working up crude animal and vegetable fats from a mere routine of labor to the dignity of vocation requiring no little acquaintance with the principles of science.

In chemical composition there is a close resemblance between fats of animal and vegetable origin. They consist chiefly of mixtures of three salts—stearine, palmitine, and oleine. These three substances are composed respectively of stearic, palmitic, and oleic acids, united with a base—glycerine. Tallow consists of a mixture of stearine and oleine, while palm oil is chiefly composed of palmitine and oleine. When these bodies are mingled with a solution of caustic soda or potassa, a chemical change ensues. The acid of the fat leaves its base and unites with the alkali, forming a soap, while glycerine, which was the original base of the salt, is liberated and remains dissolved in the water. The action of these fat-salts is precisely similar to that of other chemical compounds. They are subject to the same chemical laws, and they may be precipitated and reunited in a manner similar to the reactions which govern the combinations and decompositions of purely inorganic matter. In strict chemical language, a soap is a compound of a fatty acid with a base, whether it possesses any detergent properties or not. Thus we may have iron soap, lead soap, lime soap, &c., as the acid—stearic for example—may be made to combine either with oxide of iron, oxide of lead, or with lime. But in the usual acceptation of the term, the name soap is restricted to a union of the fatty acids with either soda or potassa.

The discovery that fats are mixtures of salts, and that they may be readily decomposed, was the result of Chevreul's investigation. With a perception of the great benefits which his researches would confer on the arts, in 1825, in conjunction with Gay-Lussac—a name worthy of association with his own—Chevreul obtained a patent for the manufacture of the fatty acids, comprising many of the processes which have been since adopted. But, gifted as were these great chemists in their acquaintance with the methods of original research, they could not successfully put their experience to a practical result; and it was not until 1831, when De Milly overcame the difficulties of manufacturing stearine on a large scale, that the real benefits of the process were established; and to the unwearied efforts of this chemist are due the results which have followed from Chevreul's discovery.

By the specification of the original patent the crude fats were saponified with either lime, soda, or potassa, and the resulting soap decomposed by means of an acid which united with the base, leaving the fatty acids free. The reason of the failure of the patentees was that soda and

potassa, which they used, were too expensive. De Milly successfully employed lime, which was a far cheaper substance. The insoluble soap thus obtained was decomposed by sulphuric acid, which united with the lime, forming sulphate of lime, while the fatty acids in a free state were cooled in shallow pans made of tin or copper, in order that the more solid portion—the stearic and palmitic acids—might crystallize. The solid mass was then pressed to remove the more fluid oleic acid, when it was employed in the manufacture of candles. These were made in a factory in Paris, near the *Barriere de l'Etoile*, whence the name “star candles,” which still characterizes the product of stearic acid throughout Europe.

The troubles and annoyances incident to the establishment of a new art were not unfelt by De Milly. The removal of the last trace of lime was difficult; and if the resulting fatty acids were not thoroughly cleansed from even traces of sulphuric acid, the latter would react on the pans and color the product. The candles retained a crystalline structure, which caused them to be brittle, while other drawbacks were experienced. But with a determination worthy of the subject these troubles were successively overcome, and after five years of unremunerative toil De Milly perfected his arrangements; and from that date the manufacture has been prosecuted without intermission. The stearic acid industry, although resulting solely from Chevreul's researches, seconded by the practical efforts of De Milly, may be said to have been perfected in 1836, from which time the business has gradually extended to all civilized countries. Under the various names—adamantine, stearine, composite, and star candles, the products of this important manufacture are found in all markets, and their vast superiority over tallow candles, and their cheapness compared with wax, have created a large demand for them.

From the importance of the industry thus originated, it is not surprising that a great impetus was given to other investigations on fatty substances, or that other processes should be devised. Some of the very methods which have been since resorted to, were indeed indicated by Chevreul in his original patent, but were but imperfectly worked out. Among these was the so-called saponification by sulphuric acid, which, although a misnomer, has passed into common use. In this process there is no real saponification, as no soap is formed. The interesting action which ensues has been investigated by Frémy, who has defined the analogy between the action of acids and alkalies upon fats. When tallow or any compound fat is treated with strong sulphuric acid, both the fatty acids and the glycerine combine with the sulphuric acid, forming sulphostearic, sulphopalmitic, sulpholeic, and sulphoglyceric acids.

On treating the mixture with water, the sulphoglyceric acid is decomposed into sulphuric acid and glycerine; while the stearic, palmitic, and oleic acids separate on the surface of the water, in which the sulphuric acid previously combined with them dissolves. The compound acids thus formed, however, caused the product to assume a dark color, which was far from desirable, and it was found necessary to subject them to distillation. This process is now conducted in many places. The crude fat is placed in lead-lined vessels and mixed with strong sulphuric acid, and is heated by means of a steam coil. The temperature is maintained for eighteen to twenty hours, when the dark compound is washed with boiling water to free it entirely from sulphuric acid, when it is distilled at a temperature of 500° Fahrenheit, while a jet of steam superheated to 680° to 720° is passed into the still. The operation lasts about twelve hours, when the fatty acids are cooled and pressed. This process, compared with that in which lime saponification is used, possesses some advantages. In the former, from the same grade of tallow and palm oil, the yield of candle stock is forty-seven per cent., while in the latter it is sixty-two per cent. The grade of stock produced, however, is inferior in quality.

A still further advance in this important branch of technology has been perfected by Mr. Wilson, of the Belmont candle works, near London, who in 1852 succeeded in decomposing palm oil by means of water and distillation. The fat is introduced into a still and heated to a temperature of 550° to 600°, and a current of superheated steam divided into minute jets is passed through it. By this process the fatty acids and glycerine are distilled at one and the same operation; but, although its success on palm oil is assured, it does not answer for animal fats.

Various other methods for decomposing crude fats have been suggested and carried out on a working scale. Among these may be mentioned that by saponification by water under high pressure, which is due to Chevreul. In 1854 Mr. R. A. Tilghman, of Philadelphia, patented a process in which the fat is mixed with from thirty to fifty per cent. of water, and placed in a vessel where it may be kept at a temperature about the melting point of lead, and maintained until the operation is finished. In this process the fat is decomposed into the fatty acids and glycerine, which admit of a ready separation. The former are cooled and pressed, when they are available for candle stock. This process, with some modifications, is used in many establishments.

In the same year in which Tilghman patented his process De Milly introduced an invention founded upon a discovery he had made, that if fats were heated to a high temperature with a minute quantity of lime—much less than is required to saponify the fat—a perfect decomposition

would ensue. This process, which at first was received with but little favor, has been adopted in many factories where it is yet used. A still simpler method has been brought out by the same inventor, which is thus described by M. Balard: "In the establishment of M. de Milly the fat is melted and heated to 120° C. (248° F.); it is then allowed to flow from its reservoir and mix with a stream of strong sulphuric acid, in the proportion of six per cent. of the latter. The mixture is rendered perfect by means of agitation. The action takes place immediately, and is arrested in two or three minutes by allowing the mixture to flow into boiling water, when the sulphuric acid and unaltered glycerine enter into solution, and the fatty acids float on the surface, being of a dark color. But, contrary to what takes place in the ordinary method of saponification by sulphuric acid, the coloring matter is completely soluble in the liquid fat acid, so that by cold and hot compression the solid fat acids are obtained perfectly white, ready to be moulded into candles. The entire operation can be accomplished in one hour."

The great simplicity of this process, and the fact that it requires but a small amount of capital and very little apparatus, will doubtless bring it into general favor. It has been introduced into various parts of Europe, and has been likewise patented in this country.

From the foregoing account of the more important processes which have been devised to effect the decomposition of fats into their proximate constituents, it will be seen that they have been the result of profound and elaborate chemical research, and that the business has been elevated from the category of a mere handicraft to the dignity of an art requiring no small amount of intelligence and scientific knowledge for its successful prosecution. The names of Chevreul, Gay-Lussac, Cambraces, De Milly, Boutigny, Wilson, and others are identified with the successive stages of the development of this industry; and the mere association of such chemists with any branch of technology is sufficient to award it a high position among manufacturing pursuits.

The products of the decomposition of fats, whether obtained by direct saponification by lime and the subsequent decomposition of the lime soap by a mineral acid, or whether produced by the action of sulphuric acid, or water, or superheated steam, are essentially similar—differing only in quality, with perhaps some slight diversity in the relative proportion of solid and liquid fat acids. The salts of the latter are decomposed, the acids set free, and the base—glycerine—liberated. As before remarked, the stearic and palmitic acids, which when cooled are solids and separate in the form of a granular, semi-crystalline mass, still retaining a portion of the oleic acid, which is fluid. The solid acids, when subjected to powerful pressure, possess properties which render them

far superior to ordinary tallow as a material for candles. Their melting point, in the best qualities produced by lime saponification, is about 130° F., while tallow becomes soft and melts at a much lower temperature. The stearic acid candles are hard and firm to the touch, and are almost entirely devoid of a greasy feel; and for convenience and cleanliness almost rival spermaceti, while their cost is much less.

In the early stages of this manufacture the oleic acid, which was intended by Chevreul and Gay-Lussac as a material for soap, was unsaleable, as soapmakers were prejudiced against it because of its dark color. De Milly, who allowed no trivial impediments to obstruct his plans, at once embarked in the manufacture of soap as an adjunct to his other business, and thus worked up all his residues within his own establishment. Other manufacturers soon followed his example, and now soap-making forms a part of the occupation of nearly all well regulated factories where the fatty acids are produced.

Among the benefits conferred by the development of this branch of industry is the production of glycerine of a remarkably pure character and low cost. This substance was discovered by Scheele in 1776, who called it the *sweet principle of oils*. It was prepared by boiling equal parts of olive oil and litharge together with water. A saponification ensued, the oxide of lead uniting with the fatty acids of the oil, while glycerine was liberated. But the theory of the reaction was not understood, and it remained for Chevreul to investigate and explain the decomposition. In pharmacy, in the manufacture of lead plaster, glycerine is a residual product; but the quantity thus prepared was exceedingly limited, and moreover, as it was apt to retain traces of oxide of lead, it was objectionable on this score. It is now manufactured on a large scale as a residue from the decomposition of fats, and has met with greatly extended uses in the arts, while its applications in pharmacy are highly important. Among the technical uses of this substance it has been applied to preserve articles of food which require to be kept moist; for one of its peculiar properties is its faculty of retaining its liquid condition. It is often mixed with fine-cut chewing tobacco to prevent its drying and crumbling to powder. It has been recommended for keeping modelling clay moist. Its solvent powers and antiseptic qualities have rendered it susceptible of many applications, and it is likewise largely used as an ingredient in the manufacture of copying ink. As it never freezes, it is often used to fill wet gas metres. It is also employed as a lubricating agent for delicate machinery, such as clockwork.

But, within a few years, the application of glycerine to the manufacture of that fearfully explosive compound—nitro-glycerine—has greatly

enlarged its utility. This substance, which is also known as *glonoin*, was discovered in 1847 by Sobrero, and has been investigated by Railton and De Vrij, although its practical application as an explosive was first made in 1864 by Nobel, a Swedish engineer, who has succeeded in introducing it in mining and blasting operations in all parts of the world. The terrific force of this compound, and the fearful accidents which its incautious handling and transportation have occasioned, are matters of recent newspaper record.

The process of manufacturing nitro-glycerine is similar to that of preparing gun-cotton. Glycerine of a syrupy consistence, and a density of 1.262, is poured with constant stirring into a mixture of strong sulphuric and nitric acids, the temperature being kept below 75° by cooling the exterior of the vessel with ice. As soon as oily drops begin to form on the surface, the mixture is poured with constant stirring into cold water. The nitro-glycerine separates. It is washed from all traces of acid, and freed from moisture by drying in small portions with great care. As thus prepared it is a yellowish oily looking liquid of specific gravity 1.595 to 1.600. It is without odor, but has a sweetish, aromatic taste, and when even the minutest quantity is placed on the tongue it produces severe headache. It sometimes undergoes spontaneous decomposition. It detonates when struck with a sharp blow, and seems to behave in different ways, according to the manner in which it is prepared—for there are several ways of making the mixture.

Nitro-glycerine is very extensively used in blasting operations. Its explosive force is much greater than that of gunpowder—some authorities estimating it at ten times that of the latter; so that even at a much higher price it is cheaper. The blast-holes required to use it are fewer and smaller, while a much greater area of rock may be thrown down by a comparatively small charge. Its use, however, is attended with great danger. Sometimes mere concussion is sufficient to ignite it. It freezes at a temperature of about 45° , and while in this condition it is quite as liable to explode as when liquid. The mere friction of the frozen particles against each other will cause them to explode with terrific violence. A few years ago in Silesia, where it was used in blasting a tunnel, a quantity of nitro-glycerine became frozen. The foreman attempted to break up a lump weighing several pounds with a pick, when an explosion ensued, destroying everything within the reach of its power.

Various methods have been devised to remove the great danger attending the use of this explosive. Nobel has recommended that it be mixed with wood spirit, which disarms it of its power of exploding by percussion or heat. This mixture may be readily separated into its original ingredients by the addition of water, which precipitates the

nitro-glycerine as an oily liquid with its explosive properties unimpaired, and which merely requires decantation and drying. The same inventor, who has followed up this line of investigation with great ingenuity and perseverance, originated the use of dynamite, which is a mixture of nitro-glycerine with an infusorial earth known in Germany as *kieselguhr*. This compound, although perhaps not so powerful an explosive as nitro-glycerine in a liquid form, is yet far more so than gunpowder, while it may be safely transported, and may even be subjected to concussion without danger. Another compound of nitro-glycerine—lithofracteur—more powerful than dynamite, has been invented by Engels. It consists of nitro-glycerine mixed with some absorbent, with portions of other explosive bodies—such as chlorate of potassa, or the constituents of ordinary gunpowder. Sawdust and other materials have been likewise used with the original fluid explosive, under the name of dualine, or glyoxiline.

From the number and variety of the products of the decomposition of fats it will be perceived what signal benefits have been conferred by the researches of Chevreul, and what an important part these substances play in industrial pursuits. This particular department of the utilization of fats affords a beautiful example of the value of chemistry as applied to the arts. Starting with raw materials reeking with blood and offal from the butcher, or crudely expressed from the fruits of foreign trees—materials which are offensive to both sight and smell—it has produced finished products characterized alike by their beauty, cleanliness, economy, and great utility, while it has also furnished us with explosives almost indispensable in the prosecution of engineering work.

But fats have other uses in the arts, and to some of these we must briefly refer. A large quantity of the commoner varieties of grease is directly utilized in the manufacture of soap, without previously undergoing the processes devised by Chevreul. In this operation the grease is melted and run into large boilers, generally heated by a steam coil, along with caustic soda ley. Saponification ensues, and when in the judgment of the manufacturer the operation is perfected, a quantity of salt is thrown into the mass to “settle” the soap, which being insoluble in a solution of salt, rises and floats on the surface. The spent leys are drawn off and the soap ladled into “frames,” where it cools and hardens, when the sides of the frames are removed and the mass cut into bars for sale. This process, although a simple one, requires to be managed with no little care. A boiling of soap may be easily spoiled by inattention or neglect, and the value of the product largely depends on the care with which it is made.

Ordinary hard soaps consist of a mixture of stearate, palmitate, and oleate of soda; while the soft soaps include corresponding compounds of potash. The common yellow soaps of commerce consist usually of from forty to sixty per cent. of fat acid, with from six to ten per cent. of soda, the greater part of the balance being water. A soap of uniformly good quality should yield on analysis about sixty per cent. of fat acid, six to seven per cent. of soda, and not more than twenty-six to thirty per cent. of water. As the alkali is cheaper than the fat, it is a common thing for some manufacturers to crowd in far more alkali than is required for saponification. Soaps containing this in much excess, are extremely injurious in the laundry, showing a tendency to rot linen and cotton fabrics; and there is no doubt but that a large saving might be effected in many households by taking care that these adulterated soaps be rigidly excluded. Soaps of this kind are often advertised with high-sounding names, and great claims are made in behalf of their value; but their power of extracting dirt is frequently equalled by their destructiveness. Soaps for which an extraordinary degree of detergency is claimed should be regarded with suspicion, and their use should be avoided.

Fish oils have many important uses in the arts. For burning in lamps, lubricating machinery, as materials for making fulling and scouring soaps, and for various other purposes they are largely employed. They consist chiefly of oleic acid combined with glycerine, although containing quantities of stearine and palmitine; but the great preponderance of the former compound imparts fluidity to the oil. Fish oils are also extensively used in the manufacture of leather, and in various other branches of business.

From the foregoing hasty glance at the principal industrial uses of fats it is apparent that they occupy a position of great importance among the raw materials which minister to our needs, and that through the instrumentality of science they have been rendered susceptible of a wide range of applications which entitle them to be regarded among the most indispensable objects of trade. The manner in which the successive developments of the fat acid industry have been wrought out affords a beautiful example of the adaptability of chemistry to the practical affairs of life, and furnishes an indication of what may yet be done in other and different branches of manufacture, when they shall have been studied with the same persistence as has characterized the researches into the nature of such apparently uninviting subjects as the crude fats of commerce.

MINING AND METALLURGY.

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WE recently alluded to the value of the iron resources of North Carolina, and referred to the great abundance and remarkable purity of the ores comprised within the counties of Guilford and Rockingham. Since then, through the kindness of Dr. F. A. Genth, we have been favored with a copy of a highly interesting paper on the mineral resources of North Carolina, read by the doctor before the Franklin Institute, and which was published in the excellent journal of that society. This paper, which, from its completeness and comprehensiveness, deserves a wide circulation, is the best epitome of the economic geology of the State we have seen; and it is a matter of congratulation that its author has been requested by Prof. W. C. Kerr, the State geologist, to work up the mineralogy of the official survey. Under such auspices, we shall look for the forthcoming volumes of the report with more than ordinary interest, and with a feeling of confidence that the task has been entrusted to competent hands, which, we regret to say, cannot be remarked of some other State reports.

Among the metalliferous ores which exist in greater or less quantity in this State are those of iron, lead, zinc, copper, arsenic, antimony, bismuth, cobalt, nickel, manganese, and chromium. A few grains of platinum have been found associated with gold in Rutherford and Burke counties; but Dr. Genth considers it very unlikely that it will ever be found in large quantities. Prior to the discovery of gold in California, North Carolina produced a larger amount of this metal than any other part of the country; and while the greater wealth of the Pacific States and territories has eclipsed the position of the southern gold-bearing States, there are undoubtedly localities where, under proper management, handsome returns might be expected.

The gold of North Carolina is invariably found in a metallic form, alloyed with more or less silver, with the single exception of minute quantities of telluride, in the mineral nagayagit, which is exceedingly rare, and which is sparingly found in the King's Mountain mine. In its native state, the gold is found in small crystals or crystalline masses, or in thin plates or laminae, between the foliation of the slates, or diffused through such minerals as quartz, pyrite, zinc-blende, etc., generally in so finely divided a state as to be invisible. Dr. Genth classifies the positions in which the gold occurs as follows: 1st, in the *mass* of the gneissoid, granitic, and hornblendic rocks; 2d, in quartz veins, often associated with pyrite, chalcopyrite, alenite, tetradymite, and other minerals; 3d, in ore beds, contemporary with the strata of rocks in which they are found, as in chloritic and talcose slates, argillites, quartzites, etc.; 4th, loosely in the soil and decomposed rocks, especially in gravel deposits, resulting from the disintegration of the first three formations. Of these different methods of occurrence, the deposits which are contemporaneous with the slates themselves are regarded by the doctor as of far greater importance than the true

veins, which have been formed in fissures subsequent to the bedding of the slates. They have proved to be the only reliable workings in depth, and if they are found to be rich enough to work at all, they may be generally depended upon for the future. Among the well-known mines belonging to this class are the Gold Hill mines in Rowan county, and the King's Mountain mine, in Gaston county. The former of these localities has produced about \$3,000,000, and the shafts have been sunk to a depth of 750 feet. So imperfect have been the processes for the extraction of the gold that large amounts remain in the trailings—probably four-fifths of all the metal contained in the ore. The King's Mountain mine has been worked to a depth of 200 feet, and is said to have produced over \$1,000,000. In places the auriferous bed is more than thirty feet in thickness, and although the shafts have been sunk to the depth above mentioned, the longitudinal extent of the workings is only about 250 feet. Among the other gold mines of North Carolina which were formerly worked, but mostly with little or no profit, may be mentioned the McCulloh and Fisher Hill mines, in Guilford county; the Phoenix, Vanderburgh, Cullen, Reid, and Pioneer Mill mines, in Cabarrus; the Capps, McGinn, and Rudesill mines, in Mecklenburg. At the Reid mine, a nugget weighing between three and four pounds was found in 1799, which was kept several years without its real character being known, and was subsequently sold to a jeweler for \$8.50. When it was ascertained that it was gold, search was made at the same locality, resulting in the discovery of fourteen lumps, one of which weighed twenty-eight pounds.

Among the other well-known mining localities in North Carolina alluded to in Dr. Genth's paper, is the celebrated Washington mine, in Davidson county, now known as the Silver Hill mine. Operations were commenced at this place in 1838, and since that time it has been worked with varying success. The surface ores, which consisted chiefly of carbonate of lead, through which were disseminated threads and films of native silver, were easily smelted, and for a while produced profitable returns. But when the undecomposed ores were reached, which consisted of a mixture of fine-grained brown zinc-blende and argentiferous galenite, a much more difficult problem was presented, and great trouble was experienced in the extraction of the precious metals. Some twenty-two years ago, when Dr. Genth was at this mine, he advised the then owners—a Philadelphia company—to work the ores for zinc, and to extract silver, copper, and lead from the residues. This advice, however, was not heeded; and, if we remember aright, the company continued to smelt the ores for lead, which was cupelled for the bullion it contained. The result of not following the counsel of an expert in this matter was that the property soon passed out of the hands of its owners, and is now in possession of a company mining from 400 to 500 tons per month. This mine has furnished some of the handsomest cabinet specimens of plumbiferous minerals in existence. In some places the ores are very rich in silver. An average sample of between 2,000 and 3,000 tons yielded to Dr. Genth's assay 45 per cent. of zinc, 21 per cent. of lead, and about eight ounces of silver to the ton of ore. Other deposits of a somewhat similar character abound at points not far remote from Silver Hill, and it is probable that with the proper judgment, skill, and capital, rich gold and silver lodes might be developed.

The copper mines of North Carolina are capable of being worked with a promise of success. In this connection a notable fact is mentioned by Dr. Genth, to the effect that almost all the copper mines in the central counties of the State have been first worked for gold; and that there are hardly any mines in Guilford, Cabarrus, and Mecklenburg counties, occurring in gneissoid and syenitic rocks, which do not show strong indications of copper ores. In view of this fact, the doctor's suggestion is very pertinent, that when mining operations receive a new impetus, it is to be hoped that this very important fact will be borne in mind, and that no mine should be started without sufficient means to develop it at once to such a depth that a workable body of copper ores may be reached. The surface indications often consist of the so-called brown gold ores, which at water

level are replaced by quartz more or less richly charged with iron pyrites, through which chalcopyrite, or copper pyrites, is disseminated to a greater or less extent. The latter mineral increases in depth, and gradually becomes the predominating ore, forming a regular copper vein. In this manner many mines which have been opened and worked as gold mines have been as such abandoned, generally before the copper ores in paying quantities have been reached. Notwithstanding the favorable indications which these formerly worked gold mines present as copper mines, not one of them is now worked for this metal.

The copper region proper of North Carolina extends through Jackson, Watauga, Ashe, Wilkes, Allegheny, and Chatham counties. These localities are considered by Dr. Genth as worthy of the especial attention of capitalists. With increased facilities for transportation, there is no doubt that a stimulus will be given to the development of this source of mineral wealth; and few parts of the country promise more successful returns.

There are only two copper mines at present worked in the State. The Clegg mine, which is situated in Chatham county, is included in a quartz vein, occurring in argillaceous slates. It has been sunk upon to a depth of 200 feet, and has furnished large quantities of rich ore. Chalcopyrite is the prevailing product, but azurite has been found in beautiful crystals, along with other cupreous minerals. This mine is well managed, and is supplied with efficient machinery. It is proposed to erect smelting works on the property.

The Emmons, or Davidson mine, near Lexington, which was first opened as a gold mine, is now worked for copper. The ore occurs in a dark bluish-green chloritic slate. Its yield of gold was poor, being but about thirty-seven cents per bushel.

The iron ore deposits are alluded to by Dr. Genth as being the greatest resources of the State, the importance of which, when developed, will far exceed any other mining interest. He also predicts that, as an iron-producing State, it will stand foremost, not only because of the inexhaustible quantities of the ores, but because of their superior quality and their adaptability to the manufacture of the highest and best grades of iron and steel. The ores include nearly all the varieties of ferruginous minerals, and their purity and extent are in many instances remarkable. We have already alluded to the Tuscarora and Shaw ore belts, which are outcrops of the same synclinal basin, and where the average yield of the ore (titaniferous magnetite) is 55 per cent. of metallic iron. The High Shoals property has been extensively worked. Near King's mountain extensive beds of magnetite occur, which have been worked for many years; while in several other localities iron ores exist in such abundance as verifies the assertion that their development will form the most important branch of industry, and will draw more capital into the State than all the other interests of the people combined.

In view of the great abundance of the iron ores of the State, and the demand for fuel which their development must create, it is of the utmost importance that beds of coal of excellent quality exist. There are two coal fields, known as the Deep River and the Dan River fields, which together comprise an area of over forty square miles, containing 6,000,000 tons of coal per square mile. These coal measures, which include five seams of coal, belong to the triassic period, being contemporaneous with the coal near Richmond, Va. They are said to produce a fuel of excellent quality, varying from fat bituminous to semi bituminous, while a portion of it in the vicinity of a trap dyke has been metamorphosed into anthracite. Analyses of specimens of these coals show them to be remarkably pure.

Among other minerals which have been found in North Carolina may be mentioned the diamond, of which several have been discovered; graphite, which exists in large quantities and of very good quality; corundum, rutile, mica (in large plates), feldspar, kaolin, and barytes, which is an important article of trade, and is much used to adulterate white lead.

With workable quantities of the ores and minerals above enumerated, it must be con-

ceded that few parts of the country possess the resources to which North Carolina may justly lay claim. With capital and the proper qualifications to command success, no more promising field for enterprise exists; and while it must be admitted that large sums of money have in times past been irretrievably lost in spasmodic attempts to work the gold mines of the State, in nearly every instance such failures have resulted from causes which might have been remedied. Foremost among these may be mentioned the wild speculation and watering of stock which has characterized so many mining schemes. Another reason has been the want of a sufficient capital, and because the management of mines has been frequently entrusted to persons utterly incapable of directing their exploitation. It is to be hoped that broader and sounder views are now beginning to prevail; and, in the event of these southern mineral deposits being developed, that the work may be conducted with the same energy, care, and prudence which characterizes successful business men in the management of their private enterprises. With such precautions, the opportunities for profitable investment are nowhere greater than may be found in the mineral regions of North Carolina.

—In the rapid growth in wealth and prosperity which has characterized the Western States, no more gratifying examples of real progress have been furnished than those pertaining to the development of the immense iron resources of this section, which within the last few years have asserted their importance, and exhibited a magnitude worthy of close attention. In the States of Illinois, Indiana, Michigan, Missouri, and Wisconsin, the increased production of pig metal and manufactured iron has been very great, far surpassing the expectations of even those who have for some time past comprehended the capacities of these States, and their natural advantages as seats of an important and growing iron industry. By the census of 1850, Illinois possessed but two small charcoal furnaces, and produced but an insignificant quantity of iron. Not a bar of railroad iron was rolled in the State until 1858, in which year 1,125 tons of old iron were re-rolled there not being a single puddling furnace within her borders. In 1854 the amount of rails re-rolled had increased to nearly 27,000 tons; while last year the total amount of rails produced was 91,178 tons, of which 40,026 were new, and the remainder re-rolled. Included in the new rails were 2,800 tons of steel bars. That this year will witness a gratifying increase in the product of rails and other descriptions of manufactured iron, there can be no doubt, as Bessemer steel works of large capacity have been erected at Joliet, which will soon be ready to commence operations. By the rapidity with which Illinois has developed this important metallurgical art, the State has in a surprisingly short time become only second to Pennsylvania in the production of its rolling mills and puddling furnaces.

In the production of pig iron this State has also shown a marked advancement. Up to 1859 the average annual yield of the few charcoal furnaces in blast did not amount to over one thousand tons. In that year the supply suddenly ceased, and for three or four years no ore was smelted; but since this interval a remarkable change has taken place. In 1871, 65,000 tons of pig metal were made from seven furnaces, some of which were in blast only a portion of the time; and it is confidently expected that the operations of this year will show a greater ratio of increase than has yet been experienced.

In the adjoining State of Indiana, iron mining and manufacturing have likewise received a healthy stimulus. In 1850 the condition of the iron manufacture of the State was similar to that of Illinois. But two small furnaces were in operation, whose total annual product was less than 2,000 tons. In 1860 even these small establishments had gone out of blast; and for seven years thereafter all the iron used in the State was brought from a distance, much of it being of British manufacture. Within the past few years, in the vicinity of Brazil, in Clay county, six large furnaces have been erected, where the iron ores are smelted with the celebrated "block coal," which was recently alluded to in this department. This coal is used not only in the vicinity of the mines, but is shipped

in large quantities to Missouri and other States, where its valuable qualities especially commend it to the attention of iron masters. In Clay county alone the annual production of pig iron is now about 50,000 tons.

The iron resources of Michigan have long been known and appreciated; but as by far the largest proportion of the ore is shipped beyond the limits of the State, the great magnitude of this trade has perhaps overshadowed the importance of the production of pig metal and manufactured iron. Until the completion of the canal around the falls of Sault Ste. Marie, these ores were not available for export; but since that time their great excellence has created markets for them far remote from the mines. The vast importance of this business may be inferred from the fact that while in 1856 the shipments of ore from Lake Superior amounted to but 7,840 tons, in 1871 they reached the enormous aggregate of 910,984 tons, and this does not include the ores utilized in the furnaces and bloomeries of the State. These Lake Superior ores are exceedingly rich in iron. They consist chiefly of that variety of the peroxide of iron known as specular iron ore, and sometimes exist almost in a state of chemical purity. Some magnetite is also mined with the other ores.

The iron industry of Michigan dates back to about 1854, when about 900 tons of pig metal were smelted. A steady and gratifying increase has since then been observed, until the annual product is now about 100,000 tons. Of manufactured iron, one establishment alone produced in 1871 about 14,000 tons of railroad bars. Bessemer steel works have been erected in the State, and this branch of metallurgy is receiving merited attention.

The wonderful deposits of iron ores in the eozoic and palæozoic rocks of Missouri have become familiar through numerous descriptions, and also from the practical results of their exploitation. Among these renowned localities, the celebrated Pilot Knob and Iron Mountain possess an interest which has rendered them unique in the history of mining; but these remarkable ore banks are not alone in the list of prominent deposits which have been discovered in other parts of the State. Shepherd's Mountain, the Bogy Bank, Russell's Bank, and a remarkable locality in Dent county where the ore consists almost wholly of a pure mass of peroxide of iron, afford examples of the extraordinary resources of Missouri.

The statistics of the manufacture of pig iron in this State are reported as follows:—

<i>Year.</i>	<i>Tons.</i>	<i>Year.</i>	<i>Tons.</i>
1854.....	5,708	1864.....	16,514
1856.....	11,720	1866.....	15,980
1858.....	10,154	1868.....	83,600
1860.....	20,198	1870.....	77,852
1862.....	9,476	1871.....	82,685

Of the production of 1871, 89,934 tons were smelted with charcoal, and 42,751 tons with mineral coal, a large proportion of the latter fuel being the "block coal" of Indiana, which is so eminently adapted for metallurgical purposes.

During the last year a variety of causes operated to the disparagement of the iron interests of this State. Low water in the Mississippi and Ohio rivers prevented, for more than six months, shipments of ore to Indiana and Ohio, where large quantities are usually sent, thus reducing the amount mined; while the falling off in demand in the spring, and consequent low prices for foundry iron in spring and summer, led to a suspension at the stone coal furnaces in South St. Louis, which only ran to about half their capacity for the year.

Among the other Western States, Wisconsin holds no insignificant position as a producer of iron. According to the census of 1850, but one iron furnace was in operation in this State, the annual production of which was stated to be 1,000 tons of pig metal.

Other authorities, however, state that no pig iron was produced in Wisconsin until 1856, when the number of tons smelted was 2,500. In 1858 the yield had decreased to 387 tons, rising in the following year to about 5,000 tons, all of which was charcoal iron. In the early part of 1870 the Milwaukee Iron Company blew in a furnace, which in 1871 made 17,749 tons of iron. Another furnace erected by the same company was put in operation in May of the same year, which in eight months produced 10,500 tons of pig metal. In the same year the rolling mill at Bayview turned out nearly 29,000 tons of railway iron.

These figures, which must be gratifying to every person who is interested in the mineral and metallurgical industry of the country, serve to show what are the beginnings of the capabilities of the West. That these resources will be developed with the same energy which has characterized the construction of railroads and the prosecution of the various branches of business, can hardly be doubted. If the next decade presents a corresponding increase, the mining and metallurgical interests of this section of country will assume such proportions as will cause them to dwarf the production of some of the older States, to which the other parts of the Union have hitherto been tributary.

—At a late meeting of the London Geological Society, a letter was transmitted by Earl Granville from the embassy at Copenhagen, stating that large masses of meteoric iron had been brought home by the Swedish Arctic expedition from the coast of Greenland. These masses vary much in size, the largest weighing twenty-one tons. Mr. Forbes, a fellow of the society, who had recently returned from Stockholm, stated that the largest specimen, which has a maximum sectional area of about forty-two square feet, has been placed in the hall of the Royal Academy of Stockholm; whilst, as a compliment to Denmark, on whose territory they were found, the second largest, weighing about nine tons, had been presented to the museum of Copenhagen. A chemical analysis of several of these specimens proves them to contain nearly five per cent. of nickel, with from one to two per cent. of carbon, thus establishing the identity of their chemical composition with similar bodies of extra-terrestrial origin. When polished and etched by acids, the surface of these masses shows the peculiar markings common to meteoric iron. When discovered, these masses were observed lying loose on the shore, resting upon basaltic rocks, probably of miocene age, in which they appear to have been originally imbedded. As the chemical composition and mineralogical character of these masses of native iron are different from those of any iron of terrestrial origin, Prof. Nordenskjöld regards them as aerolites, and accounts for their appearance in the basalt by supposing that they proceeded from a shower of meteorites, and buried themselves in the molten basalt during an eruption in the miocene period. Although these masses were found lying on the shore between the ebb and flow of the tide, upon their removal to Stockholm it was found that they became rapidly disintegrated to powder. It has been attempted to preserve them from atmospheric contact by coating them with varnish, but thus far without success; and it has even been proposed to preserve them by keeping them in a tank of alcohol. At the meeting of the society, Mr. Maskelyne stated that the British Museum already possessed a specimen of this native iron, and accounted for its rapid destruction on exposure by the absorption of chlorine from terrestrial sources, which caused the formation of ferrous chloride. This was particularly marked in the case of the great Melbourne meteorite in the British Museum, which he had succeeded in protecting by coating it externally, after heating it gently, with a varnish made of shellac dissolved in nearly absolute alcohol. He considered it probable that a meteoric mass falling with immense velocity might so shatter itself as to cause some of its fragments to enclose fragments of basalt, and even to impregnate the neighboring mass of basalt with minute particles of the metallic iron. But he considered the question of meteoric origin could only be decided by examining the same mass of basalt at some greater distance from the stones themselves, so as to prove whether the presence of such metallic iron was actually characteristic of the entire mass of rock.

—At a recent meeting of the Polytechnic Association of the American Institute of New York, Mr. Abram E. Hewitt referred to the iron region of Alabama as being the most interesting in the United States, and specified it as the only place upon our continent where it is possible to make iron in competition with the cheap iron of England, measured not by the wages paid, but by the number of days which enter into its production. The cheapest place hitherto known for the manufacture of iron is the Cleveland district of Yorkshire, England, where the iron, which is smelted from a fossiliferous ore containing phosphorus, is cold-short. At this point it costs thirty-two English shillings per ton, which represent about ten days' labor. The distance of the coal and the ore from the furnaces averages about twenty miles. In Alabama, on the contrary, there are many localities where the coal and the ore are only half a mile apart. In some of these places the iron ores occur in beds 150 feet in thickness. As yet, the manufacture of iron is carried on in rather a crude way in this State, but the cost of the metal is only about ten days' labor to the ton, which is a very close approximation to the labor cost in Cleveland. These ores contain phosphorus, and hence they are not applicable to the manufacture of steel; but the metal they produce is admirably fitted for the face of rails, and for bar iron generally, while, by mixture, good grades of merchantable iron may be made. Regarding the future prospects of the iron ore region of Alabama, Mr. Hewitt says: "The consumption of iron is increasing at a rate so wonderfully rapid that in ten years it will be impossible for Great Britain to supply the demand. There is no other country in the world which can make iron as cheaply as Great Britain. In fifty years, then, the United States must be the source from which the iron of the world will be derived. Instead of importing a million tons per annum, as we now do, in fifty or a hundred years we shall export five or ten millions per annum. This region—so exhaustless in its supplies, so admirably furnished with coal, so conveniently communicating with the Gulf—will be of infinitely more consequence to us for its iron than it has ever been for its cotton. There is a foundation for an industry and a prosperity which no curse of slavery, no rebellion, no interference with commercial laws can ever overturn." Mr. Hewitt's opinion, it will be perceived, is a very enthusiastic one; and yet, as an expert in matters pertaining to the manufacture of iron, no more competent authority could be desired. The same remarks which he made in reference to Alabama apply with equal force to the iron ores of eastern Tennessee, which is likewise destined to take a prominent rank as a source of iron. With the necessary capital and proper management, the iron resources of the South would exhibit a magnitude and an importance which would be almost incredible to those who have not paid attention to the subject.

—MEASURES are being taken to erect extensive smelting works at Denver, Colorado, for the purpose of reducing the gold and silver ores for which, at present, existing works in the territory do not possess the required capacity. Large quantities of these ores, for want of proper facilities, are now being shipped eastward—some of them even being consigned to Liverpool and Swansea—while, with properly managed metallurgical works, they might be smelted within a reasonable distance of the mines, at a great saving of time and transportation. That a home market for the various grades of ore would produce a healthy stimulus and encourage the prosecution of mining, there can be no doubt; while at the same time the increase in the number of reduction works would create a competition which would redound to the interest of the miner. The selection of Denver as a site for the proposed works would make an available market for the South Park silver mines, and on the completion of the Boulder Valley railroad to Boulder, it would afford a valuable outlet for the ores of Gold Hill and Ward district. In summer, the mere transportation charges on these ores to Black Hawk is from \$25 to \$80 per ton, which is exorbitant; while in winter, there are no transportation facilities at command. These ores can be delivered in Denver at but a fraction of the above-mentioned expense. This place has become an important railroad and business centre; and by reason of the high position it

will ere long occupy among the thriving cities of the West, it is peculiarly fitted to be the seat of a metallurgical industry as limitless as the production of the mines of the territory.

—Among the other industrial enterprises of Pittsburgh, the smelting of silver ores promises to be an important occupation. A furnace has been already erected and is now running successfully, and in all probability it will serve as the nucleus of one or more extensive smelting works, where ores of the precious metals may be cheaply reduced. Large quantities of ores from Utah and other western Territories are forwarded in sacks by the Union Pacific railroad and its connections to New York, whence it is shipped to Swansea, in Wales, passing directly through Pittsburgh on its way. The expenses of transportation over this long route are very heavy, while the cost of smelting in Utah, owing to various causes, is much greater than it would be in a city so favorably situated as Pittsburgh, where fuel of the best quality exists in abundance. The experiments hitherto made prove that the silver ores from the Flagstaff, Croesus, and other characteristic mines may be smelted at a cost not exceeding five dollars per ton, while the transportation charges are much less than would be the expense of smelting at the mines. As these experiments are being conducted by experienced persons, and have already progressed favorably, they may lead to the establishment of permanent works, and tend to keep the profits of smelting ores at home, instead of sending them to foreign metallurgists.

—THE so-called tin mines of Missouri have been alluded to in this department. For a few years back it has been reported that rich ores had been found and true veins discovered; but, notwithstanding the positive manner in which these statements have been from time to time reiterated, very little faith was reposed in them, excepting by credulous capitalists, who have in consequence been victimized to no inconsiderable extent. It is said that about \$150,000 have been expended in exploring greenstone, in which small crystals of magnetite were found sparingly disseminated. Buildings, furnaces, stamp mills, washers, etc., have all been erected with part of this capital, while the balance has been irretrievably squandered either in vain attempts to discover the stannic ores, or else it has gone into the pockets of "promoters."

—THE developments which are now being made in Little Cottonwood cañon, Utah, promise to bring that district into great prominence as a source of silverores. In addition to the famous Emma mine, the Savage, Flagstaff, Davenport, and others, are spoken of as yielding large quantities of argentiferous ores, some of them being exceedingly rich. In the Emma mine, galena is widely distributed through the vein, where, according to Prof. W. P. Blake, it chiefly occurs upon the hanging wall. It exists in massive and also in the form of amorphous nodules, contained in a gangue of dolomitic breccia. This galena is very rich in silver, yielding from \$100 to \$238 per ton of 2,000 pounds. It is the chief silver-bearing ore of most of the mines in the limestone formation.

—IN reference to the silver lead ore recently discovered in Llano county, Texas, Dr. A. R. Roessler states that the outcrops of the vein are from ten to twenty feet in length, and from fifteen inches to four feet wide. A large amount of carbonate of lead is included in the ore, which will render smelting easy; and, as it is said that an abundance of fuel, flux, and building materials exist in the immediate vicinity, it is believed that the locality may prove to be one of great importance. The veins, however, have not yet been fully explored; and until their character can be ascertained, the value of the deposits must remain a matter of conjecture.

—ACCORDING to Dr. Dingler, an alloy composed of copper 58.86, zinc 40.82, and lead 1.90 parts, much resembles gold in color. It is said to be malleable and durable, and susceptible of many useful applications.

—THE product of gold and silver in Colorado during 1871 is estimated at \$4,663,000, being an increase of about twenty-seven per cent. above the yield of the mines in 1870.

INSURANCE.

WE give a chapter from the insurance history of Philadelphia in the form of a list of the insurance companies of the city winding up in the period from 1852 to 1872. Our starting point is the centennial anniversary of the birth in Philadelphia of American fire insurance, a year serving to mark conveniently the development of insurance speculation, if not exactly dating the beginning of it. Our list exhibits the main result of the active life insurance and health insurance movement from 1845 to 1850, without making note of the feeble, distinctive health insurance projects—brings again to light the marine insurance mania of 1850–60, and the exclusively fire insurance ventures which followed the crash of bubble companies attempting the complexities of the marine programme combined with fire insurance. There is something unique at this day in the idea of running the ordeal of marine hazards, hull as well as cargo risks, with a cash capital of about \$5,000; but the period we have under review furnished more than one illustration of the “enterprise” for such emergency. This once favorite branch of insurance, so tempting to adventurers, lures no more, and commercial changes and marine disasters have brought us to the time when not a single office exists in the city doing an exclusively marine business.

It is curious to note how all the projects started in the last two decades have added so little to the actual insurance resources of the city. In 1857 there were 51 insurance offices in Philadelphia—good, bad, and indifferent—a good portion being in the negative condition described by the last of these three terms; and the total this year—good, bad, and indifferent—is a little more than half of the number of 1857. The births and burials from 1852 to 1872 leave the latter year almost the counterpart of the former as to actual insurance security. We count up for the two years respectively as follows, omitting rural mutuals from both counts, and not including in 1872 concerns a year old or less, adding the 1857 column to illustrate the fluctuation, viz.:—

PHILADELPHIA INSURANCE COMPANIES.

	1852.	1857.	1872.
Fire insurance companies	10	19	16
Fire and marine insurance companies.....	4	23	5
Marine insurance companies	4	3	..
Life insurance companies.....	8	6	6
	<hr/> 26	<hr/> 51	<hr/> 27

It would certainly be unjust to assign fraud as the sole or universal agent in the origin or collapse of the companies we shall name. The list embraces offices of honorable management as well as downright swindles. It is, however, undeniable that most generally there was a lack of the requisite financial basis, as well as the absence of necessary technical qualifications for the business. Incompetency has been the ruin of more companies than dishonesty. In the fire companies named there are two projects of substantial capitalists, who withdrew on account of the unremunerative character of the business. The fire list closes with the Enterprise, the strongest Philadelphia company that was ever forced or allowed to go into liquidation.

PHILADELPHIA INSURANCE FAILURES, 1852 TO 1872.

	Organ- ized.	Discon- tinued.
<i>Marine.</i>		
Atlantic Mutual Insurance Co.....	1854	1858
Western Insurance Co.....	1855	1858
American Mutual Insurance Co.....	1881	1870
Phoenix Mutual Insurance Co.....	1804	1870
<i>Fire and Marine.</i>		
Northwestern Insurance Co.....	1854	1855
Importers and Traders Insurance Co.*.....	1853	1857
Alliance Insurance Co.†.....	1855	1857
Continental Insurance Co.....	1856	1857
Commercial Mutual Insurance Co.....	1855	1857
Independent Mutual Insurance Co.....	1850	1857
Philadelphia Insurance Co.....	1851	1857
Farmers and Mechanics Fire, Marine, and Life Insurance Co.....	1855	1858
Merchants and Mechanics Insurance Co.....	1855	1858
Merchants Insurance Co.....	1854	1859
Howard Fire and Marine Insurance Co.....	1856	1859
Great Western Insurance and Trust Co.....	1856	1859
Washington Fire and Marine Insurance Co.....	1859	1860
Columbia Mutual Insurance Co.....	1850	1860
Hope Mutual Insurance Co.....	1854	1860
Quaker City Fire and Marine Insurance Co.....	1856	1861
Neptune Insurance Co.....	1857	1861
Corn Exchange Insurance Co.....	1857	1861
Eastern Insurance Co.....	1858	1861
Guardian Fire and Marine Insurance Co.....	1867	1871.
<i>Fire.</i>		
The Cash Mutual Fire Insurance Co.....	1854	1855
Lombard Insurance Co.....	1856	1857
The Consolidated Fire Insurance Co.....	1856	1859
The Safeguard Insurance Co.....	1858	1859
Robert Morris Insurance Co.....	1858	1859
The City Insurance Co.‡.....	1856	1862
The Commonwealth Fire Insurance Co.....	1854	1862
Exchange Mutual Insurance Co.....	1855	1863
Equitable Mutual Insurance Co.....	1853	1863
The Home Insurance Co.....	1864	1866
The Equitable Insurance Co.....	1865	1867
Republic Insurance Co.....	1866	1867
The Security Insurance Co.....	1867	1867
Protection Insurance Co.....	1866	1868
The Philadelphia Fire and Life Insurance Co.....	1858	1870
The Home Insurance Co.....	1870	1871
The Enterprise Insurance Co.....	1858	1871
<i>Life.</i>		
Equitable Mutual Life Insurance Co.....	1848	1852
North American Mutual Life and Health Insurance Co.....	1849	1852
The Philadelphia Life Insurance Co.....	1848	1854
National Safety Life Insurance and Trust Co.....	1850	1855
The United States Life Insurance, Annuity, and Trust Co.....	1850	1861
The United Security Life Insurance and Trust Co.....	1868	1870
The Homestead Life Insurance Co.....	1870	1871
<i>Live Stock.</i>		
Metropolitan Insurance Co.§.....	1859	1862
Great Eastern Live Stock Insurance Co.....	1867	1868

* Originally the Merchants and Mechanics Mutual Insurance Co.

† At first the Erie, subsequently the Keystone Insurance Co.

‡ Originally the Odd Fellows Mutual Insurance Co.

§ Began in 1864 as the Philadelphia Mutual Live Stock Insurance Co.

—In all the fire insurance record of 1871 there is nothing of equal significance to the figures of the Home Insurance Company of New York, nothing more suggestive than the position of the company at the year's close—a position so well defined, massive, and accumulative, that, in contrast with the year's threatenings and apprehensions, it seems like a column of light against a background of darkness. The Home was tried in 1871 more than by fire. In the hour of its severest experience it met the busy and persistent detraction of the combined malice of opposing interests, which, unequal to the fair competition of an equal field, sought to drag the company down in the period of adversity. The result is before the world. Chicago made necessary a call of \$1,500,000 to reinstate capital, and the stockholders evinced their confidence in the trusted management by the prompt contribution of the large sum called for; and in respect to the labor to depreciate the Home in public confidence there was a yet more signal and ignominious discomfiture.

The Home is to-day a greater company than ever. It has a total of assets it never before equalled—never equalled as a result of business accumulation—and an amount of current business it never before attained in all its years of gigantic growth. Not only is the Home's business greater than that of the two next largest New York fire insurance companies put together, but the simple gain in 1871, as compared with 1870, is itself alone a larger business than is done respectively by nine-tenths of the fire insurance companies of the country. Upon the large income of 1870 (\$2,427,808) there was a gain in 1871 of no less than 24.9 per cent. This extraordinary acquisition shows that the Home is far from having reached the limits of its expansion, and that the present Home is but the germ of the greater Home of the future. Absolute certainty of indemnity has its nearest approximations in the greatest aggregate of business—"the greater the business, the safer"—and towards this absolute security the Home makes nearer approach every year.

Such great volume of business told beneficially on the result of 1871. With the greatest absolute amount of Chicago loss of any New York company, whether bankrupted or not bankrupted, it had *proportionately* the least amount of any company losing over \$380,000. Chicago makes about 16 per cent. of the total losses paid by this company in eighteen years. The financial contrast of the Home in its last two January exhibits is as follows:—

STATEMENT

Showing the condition of the Home Insurance Company of New York, January 1, 1871, and January 1, 1872.

<i>Assets.</i>		<i>Jan. 1, 1871.</i>	<i>Jan. 1, 1872.</i>
Cash in bank, etc.....		\$174,478 68	\$482,327 62
Bonds and mortgages, first lien on real estate.....		1,837,615 00	1,850,849 57
Demand loans on stocks		249,300 00	110,500 00
United States stocks, market value		1,880,937 50	1,609,357 50
State and municipal bonds, market value.....		564,390 00	60,100 00
Bank stocks, market value.....		133,425 00	
Interest due January 1.....		48,256 88	52,737 30
Balance in hands of agents.....		66,769 47	247,882 75
Bills receivable.....		9,096 71	25,502 08
Other property, miscellaneous items.....		97,811 58	106,423 63
Uncollected premiums on policies issued at office.....		6,427 25	20,318 60
Salvages.....			46,044 31
		\$4,578,008 02	\$4,672,043 50
<i>Liabilities.</i>			
Claims for losses outstanding January 1.....		199,868 71	624,021 53
Due stockholders on account of dividends.....		300 00	410 00
		\$199,668 71	\$624,121 53

Such changes as are indicated in direction of investments by the foregoing columns will meet the approval of those who appreciate the force of the latest developments in the

money market. The difference in uncollected premiums and agency accounts simply indicates the greater amount of business in process of settlement at the later of the two periods.

Of the total outstanding claims January 1, 1872, the greater part—viz., \$550,188.65—was due to Chicago; and just one month from date of statement—viz., January 31, 1872—Mr. H. S. Durand, the adjuster, telegraphed relative to the last draft in payment of the last claim arising from the Chicago devastation. So this vast Chicago liability, more than two and a half millions net, was discharged to the last dollar.

Enough for one year—enough for the most calamitous year American fire insurance has yet experienced. We add the result of the year to the Home's columns of annual financial and business growth, and the reader will find no falling back from the old, upward story.

Business and Financial Growth from 1853 to 1872.

Year.	Cash Capital.	Assets.	Income.	Losses Paid.	Dividends.
1853	\$500,000	\$647,073 45	\$190,444 23	\$12,062 32	
1854	"	742,378 00	432,391 40	216,640 90	\$65,000
1855	"	812,598 00	414,531 71	241,647 27	25,000
1856	"	872,823 00	502,317 80	246,897 56	110,000
1857	"	793,103 00	523,696 87	273,582 61	175,000
1858	600,000	1,077,990 40	593,342 65	218,575 77	110,000
1859	1,000,000	1,458,396 28	756,869 84	346,444 53	220,000
1860	"	1,494,164 65	1,034,117 93	596,806 80	160,000
1861	"	1,521,268 08	919,299 96	535,476 00	100,000
1862	"	1,746,495 68	1,109,870 45	531,951 92	150,000
1863	"	3,286,270 33	1,432,333 49	470,063 03	100,000
1864	2,000,000	3,765,503 42	2,189,299 48	1,043,061 87	340,000
1865	"	3,598,674 14	2,508,733 26	1,637,852 36	260,000
1866	"	3,645,388 87	2,859,312 87	1,874,449 08	200,000
1867	"	3,623,896 78	2,433,842 34	1,477,203 31	200,000
1868	"	3,966,282 30	2,333,326 48	1,066,451 53	200,000
1869	"	4,516,368 46	2,478,848 97	978,860 63	200,000
1870	2,500,000	4,578,008 02	2,427,308 80	1,288,415 84	*200,000
1871	"	4,672,043 50	†3,032,360 73	2,898,379 43	250,000

—**LIFE** insurance companies have never been fully recognized strictly as financial institutions, though the whole of their transactions directly concern money and its investments. Much controversy has arisen, not between life companies and savings banks themselves, but on the part of their respective advocates, tending to unjust comparisons. Both of these two classes of institutions—savings banks and life insurance companies—are, however, so far as their spheres of usefulness are concerned, beneficial to the public; and it now remains to combine the excellencies of both in order to present an agency which must commend itself to reasonable minds as a great advance step in financial economy. This combination of the benefits of both the savings bank and of life insurance has been perfected by the Hon. Elizur Wright, late insurance commissioner of Massachusetts.

The adoption of this system of savings bank policies by the Knickerbocker Life Insurance Co., a company of nearly twenty years' standing, is another illustration of the vigor and practical sagacity of its management, and the desire of its officers to meet the requirements of advanced experience. The plan shows itself to be readily available, as it makes no jar in the present life workings, introduces no fundamental changes, but, by an easy transition, following the order of established usages, greatly improves the policyholder's position.

* Also \$500,000 stock dividend.

† Not including \$1,500,000, received on calls for capital.

By it the divisible surplus due to each policy and the earned value of each policy are within the knowledge and at the demand of the policyholder. By this expedient a greater or less sum can be utilized for the purpose of insurance, according to the circumstances of the policyholders, while in the event of any exigency, the policy has a living, present, negotiable, market value, which can be turned to account for the saving of the insurance itself, or may be the means of saving a family even during the life of the head of it. The savings bank plan opens the way for more insurance—will direct more of present means towards insurance by removing all fear of assuming too great responsibility for the future. The policyholder's position is as definite while living as when dead; and living, current reasons add their force to the merits of the final award.

Briefly stated, the Knickerbocker's new policy makes the reserve which secures the insurance a deposit to the credit of the policyholder, withdrawable at annual options. An illustrative table accompanying each policy gives with clearness the whole process year after year, and discloses an equity in the basis and the workings worthy of all praise. It is an honest, open table, not a single dark way in all the figures. This table allots each of the three divisions into which the gross premium is separated, fairly to the purpose which each part is to serve. First, is the moderate percentage for expenses and contingencies; second, the share of contribution to meet tabulated mortality (*in proportion to company's actual risk*); third, the greater portion which now remains, accumulating at 4 per cent. interest, makes the reserve by which the policyholder, for so much, insures himself, the company really hazardous but the difference between amount of reserve and sum named in policy. We cite the company's explanation and example, viz.:—

"To every such policy will be attached a table analyzing the premium per \$1,000 insured by it into three distinct parts, for each year of its possible existence: First, the *margin* provided for expenses and to meet possible death-claims in excess of those expected; second, the advance *normal cost of the insurance* to be done by the company in each year; third, the *self-insurance deposit*, or reserve, which is to be accumulated at 4 per cent.

EXAMPLE.—Age 30, payable at 45 (fifteen-year endowment). Amount of policy, \$1,000, payable at 45 or previous death.

Age of entry, 30.		Gross premium, \$56.75.			Net premium, \$58.06.				
Age of Person	INSURANCE.					SELF-INSURANCE.			Age of Policy
	1	2	3	4	5	a	b	c	
	Margin.	Normal Cost of Insurance	Company's Risks.	Insurance Values.	Surrender Charges.	Deposits.	Reserve.	Surrender Values.	
30	\$8.07	\$7.72	\$952.81	\$56.82	....	\$45.86	.....	.....	0
31	8.67	7.45	908.47	50.98	\$4.08	45.63	\$47.19	\$48.11	1
32	8.67	7.16	851.85	45.67	8.65	45.92	96.53	92.88	2
33	8.67	6.84	797.83	40.89	8.23	46.24	148.15	144.92	3
34	8.67	6.48	741.28	35.21	2.82	46.60	202.17	199.35	4
35	8.67	6.09	682.06	30.15	2.41	46.99	258.72	256.81	5
36	8.67	5.65	620.01	25.24	2.02	47.43	317.94	315.92	6
37	8.67	5.17	555.00	20.57	1.65	47.91	379.99	378.34	7
38	8.67	4.64	486.81	16.17	1.29	48.44	445.00	443.71	8
39	8.67	4.04	415.28	12.11	.97	49.04	513.19	512.22	9
40	8.67	3.89	340.21	8.48	.68	49.69	584.72	584.04	10
41	8.67	2.67	261.38	5.34	.43	50.41	659.79	659.86	11
42	8.67	1.87	178.58	2.81	.22	51.21	738.62	738.40	12
43	8.67	.99	91.55	.99	.08	52.09	821.42	821.84	13
44	8.67	.00	.00	.00	.00	53.08	908.45	908.45	14
45	....	....	....	....	....	....	1000.00	1000.00	15

In this tabulation we have designated the company's columns by *figures* and the policyholder's column by *letters*, for the purpose of the following brief direction or index to the tabular combinations, viz.:—

Deduct sum of 1 and 2 from gross premium for amount of annual deposit, *a*; increase deposit, *a*, by 4 per cent. for reserve, *b*, for first year of policy age; find valuation of reserve, *b*, of any age by sum of *a* and *b* for previous year, increased 4 per cent.; deduct *b* from 1,000 to find company's risk for preceding year of age of person. Company surrender charge, *c*, is 8 per cent. of the insurance value, *d*, i. e., "the present value at the beginning of each year of all further insurance to be done by the company." Deduct *c* from *d* for value of policy to insurant in event of ending contract, *e*.

We should have preferred for the last column the title *cash* values, which, being as distinctive from *death* value, as the technical surrender values, is more expressive of the real character of the enumeration, particularly as such values are really *presenties* of surrender by affording security for money borrowed outside of the office to continue the contract.

Remaining with the company as a savings deposit, the policyholder's reserve "draws annual interest *never less* than 4 per cent., and as much more than 5 per cent. for a complete year as the average interest of the company's investments in its preceding fiscal year has exceeded 6 per cent."

"Though no dividend or return of surplus will be guaranteed, still, after two full annual premiums are paid, the party will be entitled to receive, on the payment of his next premium, any surplus that may have arisen on his policy during its *previous* year, according to the experience of the company, as to interest, actual cost of insurance, and the ratio of the working expenses to the insurance value of all its policies. These particulars being known from the company's last annual fiscal statement, any holder of one of these savings bank policies can readily ascertain, by resorting to the table attached to his policy, the exact amount of surplus to which, should he pay another premium, he will be entitled. This surplus, the company confidently expects, will, on the average, prove a strong motive to the insured to continue the payment of premiums, should he continue to need insurance."

—THE True Democrat, of Lewistown, Pa., taketh much to heart the doings of the Lebanon Mutual Insurance Company, which aforesaid Pennsylvania Mutual assesseth, indulgeth in the vanity thereof, after the fashion of its kind. It pronounceth the Lebanon *that* "Great Insurance Bubble." "He called me a wessel, Sammy—a wessel of wrath!" The Democrat wants to know who gets a certain \$50,000, which \$50,000 is piled up by the True Democrat through the following process (we omit the emphatic italics, the thrilling small caps, the exclamations of dramatic astonishment with which the denouncer shakes great Lebanon, as being altogether too exciting for the subdued expression of our undemonstrative pages):—

"On the 24th of February, 1871, the Lebanon Mutual Insurance Company made an assessment upon its policyholders of \$4 upon every \$1,000 insured. This (if a letter from the secretary now before us, dated October 17, 1871, speaks the truth, namely, that the company has \$15,000,000 insured), yielded the aggregate sum of exactly \$60,000. Yet, by the statement of losses which accompanied that assessment, there was only \$36,514.75 to pay, including the Mifflintown fire. Well, on the 20th day of the present year another assessment was made of one-half of one per cent. This latter will yield an aggregate sum of exactly \$75,000. Yet the statement of losses which accompanies this assessment foots up only \$59,116.72, including the Mifflintown losses; for strange as it may seem, the same Mifflintown losses appear again in this statement. Now here are, in the two years, losses and expenses to pay, according to their own showing, of \$95,681.47; and if the Mifflintown losses, all of which exeepting three are twice stated, shall be once deducted, as they ought to be (for they were certainly not paid twice), the sum is reduced to \$84,541.56. Yet, behold, at the same time the assessments for the same period of time foot up a total

of \$185,000, being an excess to the extraordinary amount of \$50,458.44. The question naturally arises, who gets this \$50,000 excess?"

If the writer's faith in the Lebanon is small, his belief in the promptness of policyholders in paying assessments makes up for the other deficiency. That \$80,000 so promptly paid—"yielded"—to the last dollar, is exhilarating; so is the other \$75,000, which comes on demand. Then two statements of the same unpaid losses being equal to one payment, beats our brag fire adjuster. The other examples of the cyphering, which makes wealth out of the Lebanon's poverty, should not be lost upon concocters of new fire companies—such will do to make up a surplus over losses a year or two hence. They will, of course, omit the addition of losses practiced in the foregoing as a surplusage not acceptable. Meanwhile we would like to know how many dollars of assessment it will take to pay \$59,000 of loss?

—Among the great masses of persons who are in a measure acquainted with the general character of the leading fire and life insurance offices of the country, there are comparatively few who have a definite idea of the vast proportions of the great marine bulwark—the Atlantic Mutual Insurance Company of New York. To clear away all vagueness in regard to it, it must be remembered that the Atlantic Mutual underwrites annually upon a sum unequalled by the largest of American fire offices; and beyond this, that the average marine hazard, though but of one-third duration, comprises more than double the danger of the average fire hazard in its longer period. The Atlantic Mutual sustains a yearly responsibility which is not approached in our underwriting, and has triumphed where 95 per cent. of the companies and individuals which attempted the same line of venture have failed, with destruction more or less swift. It might be said that this company meets and overcomes a Chicago of its own every year; yet the whole liability is measured and liquidated with a largeness of mental grasp on the part of the management which—separating mere finesse from solid commercial and financial ability—is not surpassed by the vaunted railroad kings. Notwithstanding their extent, the operations of the company proceed with an even regularity of movement and result which the best handled business of the smallest corporation cannot excel. Thus, though sharing in the marine disaster of 1871 with a demand on earned premiums 50¹/₁₀ per cent. to pay losses, which is in excess of the average percentage, yet practically the business of 1871 is but the continuation of that of former years. Its condensed magnitude of year's result, after payment of nearly two and three-quarter millions of losses, is—a scrip dividend of 40 per cent. of the year's millions of net earned premiums (against 35 per cent. the previous year), the payment of the scrip issue of 1868 (nearly two million dollars), and an addition of \$632,000 to the previous fourteen millions of assets. The assets are as follows:—

Assets.

United States and State of New York stock, city, bank, and other stocks.....	\$8,143,240 00
Loans secured by stocks and otherwise.....	8,379,060 00
Real estate and bonds and mortgages.....	217,500 00
Interest and sundry notes and claims due the company, estimated at.....	386,739 41
Premium notes and bills receivable.....	2,405,937 95
Cash in bank.....	274,345 01
	\$14,806,812 37

Apart from its superior security, no other form of marine insurance can approach it in the advantages it offers to the insured. Since it began business it has paid off \$25,008,200 of profit scrip issued to the insured; and this, with \$84,786,081.12 paid for losses, makes a return to policyholders of \$90,000,000 in twenty-nine years, apart from interest on scrip. Interest on scrip has itself aggregated some millions.

The following table covers the business movement of all the marine companies of New York in the last five years in comparison with that of the Atlantic Mutual:—

Statement comparing the aggregates, dividends, etc., of all the Marine Insurance Companies of New York City, with the corresponding aggregates, dividends, etc., of the Atlantic Mutual Insurance Company, for the years 1871, 1870, 1869, 1868, and 1867, respectively.

COMPANIES.	Outstanding Premiums, Jan. 1, 1871.	Written Premiums.	Total Premiums.	Earned Premiums.	Losses Paid, &c.	Return Premiums.	Total Assets.	Dividend.
New York Mutual.....	\$74,635 46	\$271,898 70	\$346,534 16	\$278,973 98	\$142,116 94 & exp.	\$8,562 81 alone	\$779,873 78	40
Pacific Mutual.....	85,010 92	692,412 95	667,423 87	552,095 19	428,164 20 do.	38,504 37 do.	1,088,547 19	15
Commercial Mutual....	150,583 00	294,226 50	414,809 50	298,331 67	151,747 29 do.	28,233 98 do.	1,093,027 15	30
Great Western Stock..	350,000 00	1,631,526 23	1,971,526 23	1,021,526 23	1,014,717 71 & rebate	899,876 85 & exp.	2,568,196 64	06
Sun Mutual.....	35,006 58	338,866 07	443,872 65	367,289 57	808,943 58 & exp.	33,824 59 alone	793,185 80	07
Union Mutual.....	129,683 91	1,011,666 83	291,350 73	147,565 10	70,550 55 do.	30,553 67 do.	1,177,102 03	30
Orient Mutual.....	314,294 50	1,181,247 86	1,495,542 36	1,146,798 10	612,846 33 do.	228,785 48 & rebate	1,936,652 54	10
Mercantile Mutual.....	239,997 95	1,560,233 49	1,790,231 44	1,508,742 46	1,865,492 73 &c., &c.	60,285 06 alone	1,935,749 67	07
Totals of all, 1871.....	1,409,212 32	6,032,068 62	7,441,280 94	5,016,301 31	4,084,579 83	818,576 81	11,097,334 30	avg. 19½
Atlantic Mutual.....	2,038,675 18	5,412,777, 51	7,446,452 69	5,375,793 24	2,785,980 68 alone	978,211 84 & exp.	14,806,812 37	40
Totals of all, 1870.....	1,397,519 99	5,047,623 71	6,495,143 70	5,085,981 18	2,877,837 89	655,970 46	10,807,081 31	avg. 20½
Atlantic Mutual.....	2,155,723 64	5,270,690 09	7,426,413 73	5,392,768 55	2,953,590 39	1,063,263 57	14,183,983 43	35
Totals of all, 1869.....	1,757,211 28	5,547,288 91	7,304,495 19	5,806,875 20	3,039,063 30	1,043,653 98	11,122,060 94	avg. 27½
Atlantic Mutual.....	2,598,001 23	6,090,063 82	8,628,639 05	6,472,915 41	2,802,245 46	1,237,630 49	14,469,508 94	40
Totals of all, 1868.....	1,795,713 33	6,370,080 08	7,798,192 52	5,891,809 06	2,930,797 24	908,988 13	11,666,797 74	avg. 26½
Atlantic Mutual.....	2,563,002 30	6,782,969 82	9,345,972 12	6,807,970 89	3,061,080 49	1,077,239 25	13,600,881 39	40
Totals of all, 1867.....	2,132,546 54	7,169,136, 66	9,301,673 20	7,240,008 20	5,477,047 07	698,144 99	10,663,312 52	avg. 10½
Atlantic Mutual.....	2,888,109 71	7,822,015 16	10,160,125 46	7,597,128 16	4,224,364 61	1,305,865 93	13,108,177 11	30

—THE legislative inquiry into the administration of the New York State Insurance department continues. House committee began to receive testimony January 23. Then a sub-committee proceeded to New York to hear the insurance men, adjourning February 19, after a prior interruption to resume inquiry in March. Great latitude is allowed to the witnesses, and much irrelevant and negative testimony comes in, with the view, as Chairman Tobey said, to find out who are the witnesses who really have anything to testify. The cross-examinations are, however, equally as unrestricted, and are at times pressed vigorously. The general course of the examination reveals the following as the leading points of inquiry: 1. The appropriation of one-fifth of one per cent. on transfer of securities. 2. The receipt of interest from banks on the department deposits. 3. The receipt of a commission for department printing. 4. Acts of the officers of companies as influenced by fear of the superintendent's power. 5. The corruption of the legislature—more power and more money bills—collections of money for passage of bills. 6. Collusion in the appointment of receivers of bankrupt companies. 7. Exorbitant charges for expenses in examination of companies. 8. As to a department "ring." To suggest an idea of the general character of the investigation and its results to the close of February, we give a brief abstract from the published daily reports.

1. In respect to first point, Mr. Miller claims that he has "a right to the one-fifth of one per cent. under the law, and that the whole amount received by him from this source is but \$4,600."*

2. Cashier Albany City National Bank testified: "There was deposited in that bank by Mr. Miller in 1870 \$46,800. Never paid any interest, nor made any arrangement to pay it."

Cashier of the National State Bank states: "Upwards of \$90,000 deposited in his bank by Mr. Miller as superintendent. Never paid any interest, nor made any agreement to pay interest."

3. Mr. Parsons, of the firm of Weed, Parsons & Co.: "Had done from twenty to thirty thousand dollars' worth of printing for the department since Mr. Miller was placed at its head. On this he had paid a commission to Henry C. Southwick of 25 per cent. Mr. Southwick commenced each interview; never had any consultation with any other person in regard to it. Three checks were produced, by which these commissions were paid; one was dated December 26, 1870, payable to bearer, for \$1,500, drawn on the Commercial bank; another was dated May, 1871, payable to bearer, for \$909.45, on same bank; the third was dated January 6, 1871, payable to H. C. Southwick, on same bank, for \$2,137.90; the total was \$4,547.25. He first drew checks payable to the order of Mr. Southwick, but that gentleman wanted them changed to bearer. The last check was held by Mr. Southwick for a few days, when it was taken back and kept in the safe of Mr. Parsons. Afterwards Mr. Southwick came and asked that his son draw the money for him. Mr. Southwick endorsed that check payable to the order of H. B. Parsons; the latter went to the bank, drew the money, and handed it to Mr. Southwick."

4. George T. Hope, president of the Continental Fire Insurance Company. To Mr. Miller: "The testimonial to you signed by officers of companies was started at the latter end of November or early in December. It was after charges had been made in the New York Times against you. Judge Savage, Mr. Wilson, and myself were active in getting up the testimonial. If you had attempted to start the testimonial you would have waited to all eternity for it. I investigated all the charges, and told those who refused to sign it that if they would tell me anything against you I would tear it up. The allegations of the New York Times I regarded as false in every particular as regards your connection with the insurance convention. The endorsement of you was signed after the election took place and after Tammany went down in a cloud of dust."

* Section 1 of an act passed April 23, 1870, making appropriations for certain expenses of government, etc. Under head "miscellaneous," viz.: "For the Insurance department, for compensation of clerks, furniture, books, printing, stationery, and other incidental expenses, thirty thousand dollars, and seven thousand dollars for expenses of moving offices, and fitting same up, and to provide necessary office accommodation for the department in New York. The aforesaid sums to be repaid to the treasury by the insurance companies, pursuant to chapter 386 of Laws of 1869, and amendments thereto, and hereafter, on transfer of securities, one-fifth of one per cent. on the amount transferred to be paid by the company making the transfer to the superintendent of the insurance department."

Mr. W. C. M. Baker, secretary of the Home Insurance Company, Columbus, Ohio: "Company was examined by Mr. Sickels, who was occupied during a part of a day; they paid him \$300, for which he gave a receipt; they thought the charge rather high, but said nothing; they requested the examination. Mr. Sickels suggested the price, \$300. The accounts were examined by a Massachusetts commissioner, who charged \$100."

James H. Frothingham, president of the World Mutual Life, of Brooklyn: "We were examined in March of last year by Southworth, Miller, and Eldridge; it occupied part of six days; the examination cost \$850; it was paid in two checks to Southworth. Never asked for a report, and never received one. The secretary proposed that we should pay \$300. For one check—the \$150 one—we received a receipt; for the other we did not. Never paid any sum to any person outside of the fees. The testimonial to Miller I declined to sign, not because I believed all the statements were untrue; I don't believe in the principle of such endorsements of a public official; I did not sign it out of disrespect to Mr. Miller."

[All the witnesses questioned as to the point testified "not afraid," and the signers of the testimonial to the superintendent declared that they signed it willingly.]

5. William H. Beers, vice-president of the New York Life Insurance Company, said that the company did not subscribe anything to aid the passage of the Miller bill at the last session of the legislature; he did not approve of it. His company always had one or more agents to watch, but not influence, legislation at Albany; the present clerk of the assembly was so engaged, and sent them the bills and information regularly.

John H. Bewley, secretary of the Universal Life Ins. Co. recollected Miller's insurance bill of last session. Never called upon any company asking them to subscribe money to aid the passage of the bill. Knows nothing whatever about money being raised to aid the passage of that bill, or for any purpose whatever. Don't know of any subscription, but heard subscriptions were taken up to aid the passage of the bill last winter. Can't recollect who told him of it. The company did not subscribe to the fund.

Henry B. Hyde, vice-president of the Equitable Assurance Society, said he had heard of a fund raised to aid the passage of the life insurance bill of last winter, but knew nothing about it except from public rumor.

Henry A. Jones, vice-president of the Hope Mutual Life Insurance Company, remembered a person named David Rowland, whom he employed to go to Albany and urge the insurance department to hasten and examine the company. He was also to obtain an amendment to the charter. Money to the amount of about \$3,000, in various sums, was paid him for that purpose. How it was disbursed the witness did not know or ask; he merely paid the bills. Rowland wanted \$5,000 to accomplish his mission, which Mr. Jones would not allow. He did not know where the bill for the \$3,000 was; he could not find it, although he had tried to, in obedience to the subpoena.

[The following is represented as being a copy, in possession of the committee, of a bill rendered to Mr. Jones.]

Henry A. Jones, of the Hope Mutual Life Insurance Company, to David Rowland, Dr.

To cash paid R. A. Southwick, for examination of company.....	\$1,000
To cash paid George W. Willer, in person, for aid in passage of his bill.....	500
To cash paid disbursements in and about amendments to charter and passage of bill ..	940
	20
	<hr/>
	\$2,460
To services rendered.....	500
	<hr/>
	\$2,960

6. John B. Van Glahn, formerly cashier of the Great Western Life Insurance Company, said: "Mr. Eldridge and Mr. Holmes, clerks in the insurance department, made an examination of the company, which occupied them about two weeks, about six hours each day. We paid \$250 for the expenses. [Receipt shown signed by Geo. W. Miller.] Mr. Bixby was appointed receiver. The directors knew nothing about it until they saw the account of it in the newspapers. Mr. E. R. Meade was the insurance superintendent's attorney. The stockholders were willing to make up the impairment. When a life insurance company is closed up, a great deal of money in agents' hands is of course lost. The cause of the misfortunes of the company was bad management and extravagant commissions paid to agents."

M. F. Hodges was appointed "receiver of the Excelsior Fire Insurance Company, but

Mr. Miller in no way influenced that appointment, and he [witness] never knew, or heard from any one that did know, anything against Mr. Miller."

7. Much of the ground of inquiry is covered by testimony which mainly is in reference to the examiners' charges—Messrs. Southwick, Eldridge, Briggs, Sickles, and one or two others conducting the examinations. Most of the companies made no objections to the charges. Mr. Miller stated that the press and committee should understand that although he was charged with taking large fees from the companies examined, he had never taken a dollar for anything but expenses. He had nothing to do with what the commissioners had done. Some of the published reports seemed to indicate that he had admitted taking large fees for compensation. Such was not the fact, and in very many cases the examinations were made at the request of the companies themselves.

George Elliot, formerly secretary of the Asbury Life Insurance Company: "We were examined last year by Messrs. Southwick and Eldridge; they were assisted by our actuary. Three days of constant work would have completed the work; we paid \$500 for it by check on the Shoe and Leather bank to Southwick. He said that was the fee. He objected to making a bill or putting a name upon it. It was made in blank without any endorsement. This is the only sum paid. Thought it strange that he wanted a check made out in blank. The examination was not made at the request of the company. Mr. Miller called in and asked us to make up an impairment of \$70,000 capital. There was \$50,000 paid in to put the company on a sounder basis. My opinion was that this was large pay for the work done; think \$200 would have been enough; never complained to Miller."

To Mr. Miller: "I am no longer secretary. Lemuel Bangs was president. I had \$4,500 in the company. Don't know who paid in the \$50,000. Stout, of the Shoe and Leather bank, is now vice-president. I was not left out of the directory on account of our management. I have heard that the death claims have doubled in 1871 over 1870. Our actuary first spoke of Southwick's fee; Bangs was present; we gave him the check. The examination extended over about ten days. I think the entire duty could have been done in three days. I entered the company in 1868, and in 1870 the capital was impaired \$70,000. When the examination was commenced the actuary had all his books written up and all preparations made. Mr. McClintock requested me to make the check in blank, at the request of Southwick. Southwick did not make the request of me, as I stated in my direct examination. Saw McClintock, the actuary, hand the check to Southwick; this was several days after the examination. I only saw that check yesterday; was surprised that it had been paid without an endorsement. English has seen me lately about this check; it was yesterday. English asked me to come around and testify. Don't think I ever spoke to him on the subject before."

Re-direct: "The reason I did not complain to Miller of Southwick's extortion was that I supposed he and Miller were one."

Mr. Hubert Giroux, president of the Lafayette Fire Insurance Company of Brooklyn. He said that during the three years of his presidency the insurance department had once officially examined the affairs of his company. This occurred during the month of August, 1870, and the examiners, Messrs. Briggs and Southwick, rendered a bill of \$300, which was promptly paid. They were occupied in the work three days. Mr. Briggs claimed that the company had declared a dividend in July, when its capital was impaired, which made its charter forfeitable. The witness, after some lapse of time, received a letter from the superintendent, directing that a report should be presented to the attorney-general, who had discretionary prerogatives as to further procedure. A consultation was held by witness with Mr. Briggs, who said that a proper presentment of the situation of the affairs of the company, which were but slightly impaired, to the attorney-general might save a forfeiture of the charter. Subsequently Mr. Briggs was retained to conduct the case, which being done, he was paid a fee of \$1,000 for his services. All this money was paid in currency, out of the private funds of Mr. Giroux. Mr. Briggs did not hint that this money did or could be used to influence the action of the insurance department. [The witness produced a letter from Attorney-general Champlain, saying that he would not institute any proceedings against the company in question.] Mr. Miller explained that the examiners were appointed by the department, and their commission and office ended with the close of the examination. Mr. Giroux was then cross-examined by Mr. Miller as to whether he had ever negotiated with him in a remote or direct manner for the payment of any money, and denied that such ever had been the case. He thought that the amount of Messrs. Briggs and Southwick's bill was reasonable, and did not object to pay it, as the same amount for such services had been cheerfully paid by another company to

a former superintendent. He was well aware that his corporation had violated a section of the insurance law in declaring a dividend while its capital was impaired. He had signed the testimonial document to Mr. Miller, expressive of the confidence of the companies in his integrity, uninfluenced by any fear or favor of Mr. Miller in case of refusal. As to the effect of the examination of his company, the witness considered that the ultimate results would be highly beneficial, although the amount of the charges might reasonably have been less.

Stephen English, editor of an insurance paper: "In the months of March, April, and May, I drew Miller's attention to the Home Fire Insurance Company of New Haven, which was rotten. Miller promised to examine it. In April the vice-president called upon me and admitted an impairment of the capital. I again called Miller's attention. He went to New Haven with ex-Senator Pierce. On the 10th of June he gave the company a certificate. He stated most falsely that a reduction of capital would render the company perfectly solvent, giving it an unimpaired capital over and above \$500,000. He said they had a capital of \$1,000,000, when they had not a dollar of capital. When Miller was at New Haven with Pierce the company drew a check for \$5,000 on Scranton & Co. On the 14th of June the following entry appears on the ledger of the company: 'Expenses, Sewell & Pierce, services as retainers, \$5,000.' I saw the entry on the ledger myself. Pierce and Miller, I heard, went to New Haven together. In September Miller made another examination, and charged \$850 for it."

Mr. Miller objected to the admission of this hearsay evidence, which was, nevertheless, admitted.

English resumed: "In January, 1871, I complained to Miller about the certificate. Miller replied, 'Well, they pulled the wool off my eyes there.' I told Miller there was a great outcry over the exorbitant charges for examining fire companies. Miller replied, 'Well, I'll see Southwick and have it stopped.' I got this check in the company's office at New Haven; it is the only check drawn on that day. I have received money in the same way myself."

Robert Sewell, attorney and counsellor-at-law, sworn: "Knew nothing of the examination of the Home Insurance Company. We were retained as counsellors for them; received a fee. [Witness declined respectfully to answer the questions of the chair as to the amount of that fee, because it was their clients' privilege to keep such matters in strict confidence.] We were counsel for the Mutual Life, but I decline to say how much or for what. No portion of the money from the Home was paid to other parties. We received and retained every dollar. No part of it was paid to Miller, or to other persons for his use. The same answer I can make regarding other companies. I did present Miller a set of shirt studs worth \$30."

To Mr. Miller: "I never was requested by you to accept retainers. Know of no money extorted by you from companies."

Ex-Senator Pierce, partner of Mr. Sewell: "I did not accompany Miller to New Haven, but I met him there when he examined the Home. I had been retained by the company two or three weeks before Miller went on. The president, Satterlee, reported to Mr. Sewell that unjust charges had been made by a man named English, and I went there by request of the company. Don't know that Miller received anything for that examination. [The witness declined to tell how much the firm received from the Home.] Not a dollar, directly or indirectly, was paid to Miller. Our fee was paid in currency by the president of the company. After Satterlee came to New York I went on to New Haven. We were engaged three or four weeks at stated periods before we completed the consultation and examination, and before it was concluded Mr. Sewell and I agreed upon the amount of the fees. Don't believe Miller knows how much we were paid. Have not seen Miller since this examination commenced."

E. N. Doughty, an insurance clerk, and formerly secretary of the Commonwealth Fire Insurance Co. The company was examined in November, 1870. The first examination was made by Mr. Southwick, and occupied several days. They paid \$300. He did not see any bill. He thought the examination was not requested by the company. The next examination was made in February or March. Messrs. Miller, Southwick, and Briggs were there. He thought \$1,650 were paid for this. Two payments were made to Southwick of \$300 and \$350, and afterwards \$1,000; that is, these were charged upon the books. George T. Haws, the president, ordered him to make the entries. The whole \$1,500 were charged to George W. Miller, and afterwards was erased by order of Haws, who did not wish to have Miller's name on the books. There was a check drawn blank. Haws and witness signed the check, and handed it to Haws. Witness never drew a check blank before, and had not seen that check since, though perhaps it came back afterwards among the vouchers. Wm. M. Tweed, Jr., the receiver, probably has it, as he has all the books

and papers of the company. He never heard who presented that check to the bank, or if it was endorsed; it was drawn on the National Trust Company.

Cross-examined by Mr. Miller: "The first examination was conducted by Southwick. I never had seen you then. This check was charged on the book subsequent to the commencement of the second examination, but am not positive. I remember you saw the erasure, and called my attention to it. I can't tell when I erased it; am not positive whether it was done during the day or night; it was done during the business hours. Haws came to me and said that Miller was coming down at that time, and 'he must not see that charge' in the books. I was surprised when you came, for you were not expected then. I remember that you called my attention to certain altered entries. Checks had been drawn and false entries made, and money fraudulently taken from the company's funds. I never believed or said that you or Southwick received that money. I paid out the \$350; of the rest I don't know."

Mr. Miller has filed his special report in response to a resolution of the New York Senate, January 18th, as to the charges against the department. He gives the following list of companies examined during his term of office. To his list we add figures of payments to examiners, according to testimony.

COMPANIES EXAMINED DURING INCUMBENCY OF PRESENT SUPERINTENDENT.

FIRE INSURANCE COMPANIES.

Name of Company.	Date of Examination.	Reason for Examination.	Payment to Examiners.
<i>New York State.</i>			
Adriatic.....	Oct. 1870	Deemed expedient.....	\$125
Ætna.....	Dec. 1871	On organization.....	140
Atlantic.....	Dec. 1871	On organization.....	
Brewers and Malsters.....	Sept. 1871	On organization.....	300
Commerce.....	Dec. 1871	By request, on account of Chicago losses.....	300
Corn Exchange.....	Dec. 1871	By request, to reduce capital.....	300
Continental.....	Nov. 1871	By request, to increase capital.....	300
Commonwealth.....	Mar. 1871	Unsoundness, and wound up.....	"
Excelsior.....	Nov. 1870	Deemed expedient.....	
Exchange.....	July 1870	Deemed expedient.....	300
Firemen's Fund.....	July 1870	Deemed expedient.....	200
Germania.....	Oct. 1871	By request, on account of Chicago losses.....	250
Hanover.....	Nov. 1871	By request, on account of Chicago losses.....	250
Holland Purchase.....	Dec. 1870	Deemed expedient.....	
Hoffman.....	July 1870	Deemed expedient (2 examinations).....	450
Hope.....	June 1870	Deemed expedient.....	50
Home.....	Nov. 1871	By request, and to repair capital.....	250
Howard.....	Nov. 1871	By request, on account of Chicago losses.....	
International.....	Nov. 1871	By request, on account of Chicago losses.....	250
Lafayette.....	July 1870	Impairment of capital.....	300
Lorillard.....	Dec. 1871	On organization.....	
Metropolitan.....	Dec. 1870	Deemed expedient.....	250
Mercantile Marine.....	May 1871	Deemed expedient.....	
Mercantile.....	Nov. 1871	By request, on account of Chicago losses.....	
Nassau.....	Oct. 1871	By request, to increase capital.....	50
New Amsterdam.....	Nov. 1871	Heavy losses by Chicago fire.....	
Niagara.....	Oct. 1871	By request, on account of Chicago losses.....	250
Republic.....	Oct. 1871	By request, on account of Chicago losses.....	250
Resolute.....	Nov. 1871	By request, on account of Chicago losses.....	150
Schenectady.....	Nov. 1870	Impairment of capital, since wound up.....	
Western.....	Nov. 1870	Deemed expedient.....	
Westchester.....	May 1871	By request.....	300
Washington.....	Dec. 1871	On organization.....	
<i>Other States.</i>			
American, Chicago, Ill.....	Aug. 1870	By request, for admission.....	125
American, Jersey City, N. J.....	Sept. 1871	By request, for admission.....	300
Alps, Erie, Pa.....	June 1871	By request, for admission.....	
Andea, Cincinnati, O.....	Dec. 1871	Impairment of capital by Chicago fire.....	300
Amazon, Cincinnati, O.....	Dec. 1871	On admission.....	300
Charter Oak, Hartford, Conn.....	Oct. 1870	Deemed expedient.....	
Cleveland, Cleveland, O.....	Oct. 1870	Deemed expedient.....	
Citizens, Newark, N. J.....	Dec. 1871	On admission.....	
First National, Worcester, Mass.....	Sept. 1870	Deemed expedient.....	

* See testimony of E. N. Doughty.

Name of Company.	Date of Examination.	Reason for Examination.	Payment to Examiners.
German, Erie, Pa.	Dec. 1871	On admission	
Home, Columbus, O.	Feb. 1871	On admission, by request	300
Home, New Haven, Conn.	Sept. 1870	Impaired capital, since failed	*
Ins. Co. of State of Penna., Phila., Pa.	Oct. 1870	Deemed expedient	
Lawrence, Boston, Mass.	Dec. 1870	On admission, by request	200
Lancaster, Lancaster, Pa.	Oct. 1870	Deemed expedient	
Lamar, Chicago, Ill.	Sept. 1870	On admission, by request	
Narragansett, Providence, R. I.	Sept. 1870	Deemed expedient	
Norwich, Norwich, Conn.	Sept. 1870	Deemed expedient	
Newport Fire and Marine, Newport, R. I.	Dec. 1871	On admission, by request	
Putnam, Hartford, Conn.	Sept. 1870	Impaired capital	
Republic, Chicago, Ill.	Sept. 1870	On admission, by request	
Reliance, Philadelphia, Pa.	Dec. 1871	On admission, by request	
Roger Williams, Providence, R. I.	Sept. 1870	Deemed expedient	
Sun, Cleveland, O.	Sept. 1870	Deemed expedient	
State, Cleveland, O.	Sept. 1870	Impaired capital, since gone out of State	
Triumph, Cincinnati, O.	Dec. 1871	On admission	200
United States Fire and Marine, Balt., Md.	Aug. 1870	Impaired capital; failed	

LIFE INSURANCE COMPANIES.

<i>New York State.</i>			
Amicable	Mar. 1871	Deemed expedient	
American Popular	May 1871	Deemed expedient (no charge)	
Asbury	Mar. 1871	Deemed expedient, and paid additional capital	500
Farmers and Mechanics	Jan. 1871	Deemed expedient, and wound up	
Great Western	Nov. 1870	Deemed expedient, and wound up	250
Hercules	Feb. 1871	Deemed expedient	200
Hope	Mar. 1871	By request, and additional capital	1000
Knickerbocker	Dec. 1870	Charges against company	2750
Mutual	May 1870	Charges against company, and by request	2500
Metropolitan	April 1871	Charges against company, and paid additional capital	1350
Merchants	— 1871	By request	40
Mutual Protection	July 1871	By request	1000
National	April 1871	By request (no charge)	
New York State	April 1871	Deemed expedient	
Standard	Feb. 1871	Deemed expedient, and sold out	800
World Mutual	Mar. 1871	Deemed expedient	350
<i>Other States.</i>			
Anchor, Jersey City, N. J.	Mar. 1871	Deemed expedient	
New Jersey Mutual, Newark, N. J.	Dec. 1870	By request	400
Republic, Chicago, Ill.	Aug. 1870	On admission	225

—THE Brewers Fire Insurance Company of Milwaukee gives evidence of being a well-conducted fire insurance organization. There is nothing suspicious or surreptitious in any of its operations, and it in no way misrepresents its condition in any of its published statements. It has proved its quality by paying \$350,000 to Chicago, and all its record accords with that prompt discharge of obligation. The Brewers has \$290,000 of assets, which are good against shrinkage in any trial. Messrs. E. E. Ryan & Co., who represent this company in Chicago, are a good example of an insurance firm, combining an unusual degree of general intelligence with professional expertness and business tact.

—AGAIN comes up the matter of the proposed investigation into the management of the Equitable Life Assurance Society of New York, the charges of a year ago being again revived in a New York paper. Upon this publication of the various allegations detailed as the petition of Leroy S. Gove, and asking from Superintendent Miller an investigation, the directors met and appointed a committee of their body "to take measures for an immediate investigation of the affairs of said company by the State authorities, and also by disinterested citizens not connected with the society."

—THE National Life Insurance Company of the United States of America maintained its business position in 1871 with steadiness, and the result is an important asset increase and a growth in net amount of insurance. This advance in the year is shown by the following comparative figures, viz.:—

	Assets.	No. of Policies in force.	Amount Insured.
January 1, 1871.....	\$1,748,021 61	7,259	\$17,758,137 00
January 1, 1872.....	2,138,240 84	7,908	19,020,722 00
Increase in 1871.....	\$385,218 73	644	\$1,262,585 00

This exhibits a favorable growth in resources in contrast with growth of liability; and by the company's valuation of policies, there is an earned surplus of \$41,536.82 above the million dollar capital which supplements the reserve as a security for policyholders. The financial management of the National is directed by the best financial ability of the country, and the life insurance qualifications of Secretary Peet are of a high order. In asset position, the National discloses a strength which we should look for from the character of its management, and gives a favorable argument as to the company's claim for the merits of premium rated ex-dividend. The column of assets shows a business well in hand, accounts promptly closed, accruing resources rapidly realized and turned into substantial interest-producing investments. Interest receipts last year, \$93,830.52—a sum more than equal to the total of payments of death claims, annuities, and surrender values.

—THE Hope Mutual Life, of New York, reorganizes its official staff and strengthens itself by important financial alliances. Charles C. Taber, Esq., a gentleman of great wealth and of important connections has been placed in the presidency; Henry A. Jones, Esq., heretofore the chief official, and so zealous and faithful, retiring to the vice-presidency. John W. Stout, Esq., the successful New York city general agent, has been elected second vice-president. Mr. Edsall, the former able vice-president, resigning for other engagements, the directors of the Hope make this declaration of his worth as an officer and of the character of his services to the company:—

Resolved, That the resignation of William Edsall as vice-president of this company be and the same is hereby accepted, and that in accepting the same the directors desire to express their conviction that he has at all times endeavored to promote the best interests of this company, and in his official relations has served it with credit to himself and to our entire satisfaction, and that to whatever field of usefulness his future labors may be devoted, we are confident that he will worthily and skilfully discharge the duties of his post; and for this reason, and on the ground of our personal esteem, our best wishes for his prosperity and success will accompany him.

—THOUGH the aggregate business of the marine insurance companies of New York shows an increase of premium receipts in 1871 as compared with 1870—the first reaction from the decline which had been in progress for some years—there was less profit to the majority of the companies. The Pacific Mutual participated in the advanced receipts, writing \$602,412.95 of premiums in 1871, against \$484,840.67 the previous year. There being a profit for 1871 of \$90,426.62, the redemption of the remaining scrip of 1866 (\$64,435) was ordered, and another scrip dividend of 15 per cent. declared. This company's profit for its seventeen years of business is \$2,552,726.62. Of profit scrip issued to insured, \$1,772,275 were paid off prior to this year's payment. Total losses paid since organization, \$6,900,000.

—AMONG the companies which had part in the Chicago calamity was the Franklin Insurance Company of Wheeling, W. Va. Since the fire, the business of the Franklin has extended, and it presents good claims to the confidence of the public. It is a company of \$200,000 capital, with an annual income approaching \$200,000. Its asset column of \$257,000 is up to the best standard. The official staff is a worthy one, and the efficiency of Secretary C. M. Coen has been proved and commended.

—IN Philadelphia insurance circles, the most notable incident of February was the resignation of F. Ratchford Starr, Esq., from the general agency of the Mutual Life Insurance Company of New York, and the appointment of his successor. Coming to us, as the intelligence does, as we are closing this department of the Review, we have not present space at command to enter upon the proper retrospect of Mr. Starr's long and conspicuous relations with Philadelphia insurance which the occasion calls for; and for this, therefore, we must wait for future opportunity. As a proper sequence and in due course of promotion, F. W. Vanuxem, Esq., received the appointment of general agent of the Mutual Life for Pennsylvania and Delaware, and well deserves this honor at the hands of the great Mutual. Chosen for the duties of local agent some years since, Mr. Vanuxem has done his work so well and thoroughly that he comes to the higher post with his fitness established beyond all question. He has associated with himself in the general agency Messrs. Edward P. Bates and William H. Lambert, two gentlemen who have had seven years' connection with the agency, and now receive this voucher of their efficiency. As about one-sixth of all the life premiums paid by Philadelphia and vicinity, to both city and other State companies, are received at this agency, the new firm of Vanuxem, Bates & Lambert certainly holds a most important and responsible position.

—OR all the American fire insurance offices which stood the test of Chicago, the Hartford Fire Insurance Company is the one which perhaps had the largest and most direct preparation for such an ordeal in prior experience. This office had borne a part in the greatest fires of the country for more than sixty years, and had always shown such elasticity in recovery from the pressure that it was taken for granted, while last October's flames were raging, that whatever companies might succumb, the Hartford would stand. The evidence of its durability was historical as well as financial. We announced in a former issue the reinstatement of the capital by the stockholders; and so, after paying \$1,500,000 to Chicago, the Hartford comes to its sixty-second annual statement with an asset total it never before equalled, being close up to three millions of substantial, unquestionable securities. At its present rate of business, the Hartford is a company of two and a half millions annual income. In 1871 the total premium receipts footed up \$1,958,915.57; gross income for the year, \$2,218,660; dividend paid, \$300,000.

—IN 1871 the Metropolitan Life Insurance Company of New York passed the line of its first million of assets, reached an annual income approaching three-quarters of a million, issued 7,602 policies, and, notwithstanding a charge of \$269,000 for additional reserve, cleared its capital of all technical impairment, and closed the year with a surplus as regards policyholders of \$318,705.78. Whoever may entertain an opinion that life insurance is declining, will certainly have to look outside of the Metropolitan for any warrant or evidence of such opinion.

Total assets January 1, 1872, \$1,197,237.78; receipts in 1871, \$642,534.11; cash disbursements, \$299,982.87. This large proportion of annual surplus accrues to an office which is vigorously pushed forward, and does not save for the present at a cost to the future. Of the outgo named, \$181,522.69 were to policyholders for losses, dividends, and surrenders.

The career of this office indicates a management of more than ordinary ability.

—PARTS I and II of the Insurance Cyclopædia, by Cornelius Walford, F.I.A., F.S.S., are out. The two parts embrace the first 152 pages, and reach "Ann" in the alphabetical arrangement of the titles. Desiring to give a publication covering the ground which this does, an examination and exposition commensurate with its importance, we defer any extended notice of it to another occasion. Mr. Walford has the special scholarship which fits him for the task, particularly as regards life insurance, and the *habileté* of research which alone can carry author and student into and through the diversified lore of the subject. In respect to the chronology of American insurance, Mr. Walford leaves it almost totally with Mr. Hine, whose history is now in course of preparation.

RAILWAYS AND TRANSPORTATION.

THE real question involved in the arguments pro and con about wide and narrow gauges, the tunnelling of mountains, and the bridging of rivers, is cheap transportation. To this end everything connected with railways tends. It is the central idea around which everything revolves; and, using the term in its relative sense, it is by this standard that all schemes of transportation succeed or fail. In looking over the annual reports of the managers of various railroads, one cannot fail to see how large a proportion of the earnings of the best managed roads are swallowed up in expenses, and how large a proportion of these expenses are for repairs and new rolling stock; and hence anything which tends to lessen these expenses is desirable as an obvious means to this end. Among the many causes tending to destroy machinery, with which the practical engineer has to contend, none are more potent than the formation of scale in boilers, and various means have been resorted to to prevent this, with more or less success on most stationary and marine engines, and these usually can and do have boilers of such size and shape that it is possible to clean them. But the railroad engineer, although he needs it far more, with but substantially one form of boiler possible—and that the best possible form to retain impurities, and almost, if not quite, impossible to even imperfectly clean—is forced to take such water as is available on the line of his road, in a large majority of cases loaded with impurities both in solution and suspension, and force it directly into the boiler without even the advantage of having it previously warmed; and that this state of things should have been allowed to continue so long argues that there are more difficulties in the way of cleansing and heating feed water to locomotives than seems at first sight to exist. Undoubtedly difficulties do exist, but they can be overcome; and we confidently anticipate the time, and that not far distant, when this source of annoyance and danger will be eradicated.

Water readily deposits its impurities held in solution when heated to 212° , and we think at even a less degree of heat; and the impurities held in suspension can be removed by filtering. We speak thus confidently in this matter, for we have reason to think from observation that very bad water, having much lime and magnesia in solution, and at times a large amount of earthy impurities in suspension, can and has been rendered practically pure by the use of a heater in which the exhaust steam came in contact with the feed water as it fell from one shelf to another, and was then filtered. This worked very successfully on a stationary engine, and the amount of mud, lime, magnesia, &c., taken from that heater after a week's run was truly astonishing. We can see no reason why, with some modification of forms, &c., this same apparatus cannot be applied to a locomotive. It is true that the exhaust steam is depended upon to create the draught necessary for the fierce fire requisite to generate the quantity of steam called for; but it would only be necessary to use a part of the exhaust for this purpose, and with a clean boiler and hot feed water there would be a material saving in the amount of fuel and fire required. The Engineer, in a late article discussing this question as applied to stationary boilers, thinks that only about eight or ten per cent. of fuel is saved by the use of a heater, on the ground that the waste steam will never heat the water higher than 212° , and the

heat of water under the average pressure is much higher than that; but these considerations cannot weigh against the prevention of scale. Besides, after the water has been purified, why cannot it be passed through a number of small pipes arranged in the smoke box, and brought up to the required heat without difficulty? as it is well known that in the best constructed locomotives there is a great waste of heat up the smoke stack, especially when the engine is working hard, and at these times the great utility of the heater would be felt. We throw out these suggestions barely as suggestions, confident that the genius of our practical engineers will in some way solve the difficulty, and thus not only materially decrease the cost of repairs, but effect a considerable saving in fuel as well.

—WHEN after much negotiation and many refusals the seaboard provinces agreed to unite their fortunes with the dominion of Canada, the government promised among other things to construct an inter-colonial railway as soon as practicable, and this promise on the part of the government was esteemed of sufficient importance to counterbalance many objections that were urged against the proposed union. Such a road in fact has long been a pet idea of many Canadians as a military necessity as well as a mercantile convenience, and by its aid Canada was to become independent of the United States at all times and seasons. The government is now proceeding to fulfil its promise in this regard, and construct the road. It cost much time and trouble to make the surveys, but they have finally been completed, and now the whole line is under construction.

The road is to run from Halifax northerly by Truro to Dorchester, thence north-westerly by Shediac through Newcastle to Bathurst, on the Bay Chaleur. It then skirts the Bay westerly to Campbelltown at its head, and thence passing up the Matapedia river, crosses to the Mitis river, and follows the course of the St. Lawrence up that stream to Riviere du Loup, a little above the mouth of the Saguenay, at which point it will connect with the Canadian railway system.

This route, as will be seen by reference to a map, is nearly a half circle—this form being rendered necessary by a real or supposed necessity of keeping at a respectful distance from the United States border, to which its nearest approach is distant about thirty miles. Its length from Halifax to Riviere du Loup, as surveyed, is five hundred and forty miles, of which one hundred and one are already completed; and it is expected that one-half of the entire line will be finished during the present year. The road is constructed through a country generally favorable, but much of it an uninhabited wilderness.

The entire cost of the road when finished is estimated at from \$25,000,000 to \$30,000,000. Of this sum about \$7,000,000 have already been expended, and as much more will be required during the coming year. The home government guarantees the bonds of the dominion for the construction of this road to the amount of £3,000,000 sterling. It is thought by many, whose opinions are entitled to weight, that the road when finished will be of no practical benefit—only represent a sentiment in fact; but although we certainly do not place as high value upon it as do our Canadian friends, with these views we cannot entirely concur. If the dominion of Canada is to remain either a foreign colony or nationality, it is certainly desirable in a military point of view as a means of connection between provinces otherwise widely separated, during at least three months of the year, by an impassable wilderness, and this is doubtless at present its chief value; but it will be very convenient in a mercantile view of the question, even should it never be required as a military road. It is true that at present there is but little business for it; it traverses a barren country, and the route is but little shorter than by sea; but railroads no longer wait for civilization, but precede it, and are discovered to be the most rapid promoters and supporters of that state of society, and they are growing more and more popular as mediums of communication, and are successfully maintaining themselves against water carriage, although located on the best of water routes.

—THE twenty-fifth annual report of the directors of the Pennsylvania railroad has just been submitted to the stockholders, and we present the following comparative state-

ment of the earnings and expenses of the road for the years 1870 and 1871, on 358 miles of main line and 258 miles of branches:—

		<i>Receipts.</i>			
		1871.	1870.	<i>Increase.</i>	<i>Decrease.</i>
From Passengers.....	\$3,719,264 86	\$3,595,371 20	\$123,893 16		
“ Emigrant passengers..	156,892 12	162,671 92	.....		\$6,279 80
“ Mails.....	147,898 12	146,743 45	1,149 67		
“ Express matter.....	862,849 90	810,785 78	51,564 12		
“ General freights.....	14,052,804 51	12,798,160 47	1,259,144 04		
“ Miscellaneous sources.	281,632 84	522,974 00	.....		241,341 16
	\$18,719,836 85	\$17,581,706 82	\$1,435,750 99		\$247,620 96
			247,620 96		
Net increase.....			\$1,188,180 08		
		<i>Expenses.</i>			
		1871.	1870.	<i>Increase.</i>	<i>Decrease.</i>
For Conducting transp'tion..	\$4,039,751 60	\$3,562,084 69	\$477,666 91		
“ Motive power.....	3,049,027 28	3,240,606 69	.....		\$191,579 41
“ Maintenance of cars... 1,202,521 74		1,186,945 17	15,576 57		
“ “ “ road... 3,802,286 95		3,058,685 78	248,601 17		
“ General expenses.....	229,845 77	211,762 82	18,082 85		
	\$11,828,433 84	\$11,260,085 15	\$754,927 50		\$191,579 41
			191,579 41		
Net increase in 1871.....			\$568,348 09		

The only items of income that show a decrease are “emigrants” and “miscellaneous;” the former is accounted for by the late war between Germany and France, and the latter from large collections made in 1870 for rents, &c., due to previous years. The great feature in connection with the annual exhibit is the proposal of the directors to increase the capital stock of the road, giving to each stockholder the privilege of buying at par at rate of 80 per cent. of his stock. As soon as the rumor of this got about, there was a strong desire manifested to buy, and about 17,500 shares of this stock changed hands on the Saturday previous to the annual meeting.

—Those people who sagely shook their heads when the project of a Pacific railway first began to be seriously contemplated, and prophesied all manner of difficulties to the enterprise, are now saying “I told you so,” with visages longer and heads shaking with more profound wisdom than ever over the present snow blockade of that road; for it has been an almost continual blockade for more than a month past, and some difficulty was experienced early in the season. The public are somewhat surprised at this, for its exemption from this trouble heretofore caused a general belief that the precautions which had been taken by the companies in constructing snow sheds, guards, and fences, had been entirely successful. This, however, is undoubtedly an extraordinary winter, and will prove no precedent; besides, some mistakes have been made, such as locating snow fences on the wrong side of the track, &c., which can be easily rectified during the coming summer. Such, at least, is the opinion of the officials of the road in a late communication, in which it is thought that by the expenditure of \$100,000 or so the road can be made unobstructable by snow even in the most severe winter. In any event the companies must take the bad with the good, and this temporary interruption furnishes the strongest possible argument for hurrying up the construction of both the northern and southern roads. The three will be needed in any event, and in winter the prospects of the Northern Pacific railroad remaining open and unobstructed by snow are much better than those of the Central, as the snowfall at the point where it crosses the Rocky mountains is much less than at the passage of the Central road, owing to the less elevation and the configuration of the country, which permits the warm winds of the Pacific to be felt much further inland at this point than further south.

—THE policy inaugurated by the Reading railroad of purchasing large tracts of coal lands for the purpose of preventing the injurious effects of the periodical strikes of the miners, and putting under the control of these corporations their principal item of traffic, seems to be already bearing at least the fruit of imitation. We now hear that the Lehigh Valley railroad has purchased the Delano tract of coal lands in the Mahanoy region, comprising an area of about 58,000 acres for \$2,000,000. Most of the working collieries on this tract are on the Lehigh Valley road, though a few of them are on the Reading road. This action on the part of the Lehigh Valley road will probably so stimulate the coal trade of that valley that a new road connecting it with Philadelphia will be a necessity. The Lehigh Navigation Company, also following the example of the Reading and Lehigh Valley railroads, has purchased the coal lands of the Greenwood Coal Company for \$1,000,000. They, too, have suffered much in their business from strikes, and have determined to put an end to them. That such a consummation is devoutly wished by every one not himself a coal miner is beyond all question; but it must be recollected that the business of coal mining is disagreeable and dangerous, and hence the coal miners do and will constitute a class by themselves, and without much fear of having their ranks overcrowded and their places supplied at short notice; and hence, whether their employers are a private individual or large corporation, they still have it in their power by combination to seriously embarrass the production of coal, though we think not in an equal degree, and the power of the corporations devoted to that end will do much to ameliorate, though it cannot wholly eradicate the evil.

—DURING the third week in January, loans for American railroads to the amount of \$15,830,000 were placed in Europe as follows:—

Northern Pacific bonds for Messrs. Jay Cooke & Co., London.....	\$6,250,000
Central Pacific, San Joaquin branch, Messrs. Fisk & Hatch, Frankfort.....	6,080,000
Gilman and Springfield R.R. of Ill., Messrs. Morton, Bliss & Co., London....	2,000,000
Marietta and Pittsburgh R.R. of Ohio, Messrs. Marx & Co., Berlin.....	1,500,000

Total known for week.....\$15,830,000

There seems to be no limit to the amount Europe is willing to lend us for reputable railroad projects, and although there is a lull in the demand for all kinds of American securities on account of the misunderstanding in regard to the Alabama claims, still this is only temporary. The home market for the same species of securities seems, on the whole, to be quite lively. There were sold of the Northern Pacific Railroad bonds alone, in the month of January, over \$1,500,000.

The London Times states that Messrs. J. S. Morgan & Co. have invited subscriptions for \$5,000,000 six per cent. general mortgage bonds of the Philadelphia and Erie railroad at the price of 87½, in instalments extending to the 25th of March next. * * * * The amount forms part of a total of \$20,000,000, of which \$18,000,000 have already been issued, and is designed for the construction of a link of one hundred and ten miles, to furnish increased facilities for the traffic of the Pennsylvania railroad to and from the West.

—EGYPT is to have another railway—this time of considerable length. The staff of engineers sent out by Mr. Fowler in behalf of the government of Egypt to survey and lay out the proposed London railway has commenced operations the whole length of the line, which we believe is between the second cataract and Kartoum, a distance of over three hundred miles. This railway has long been needed. The vast area of rich land above the sixth cataract is capable of producing cotton, sugar, grain, &c., to an almost unlimited extent, but is practically useless on account of defective transportation, which has heretofore been performed by camels, rendering the transportation of anything but spices or goods of a kindred nature simply impossible. This road is doubtless only a forerunner of a system which will ere long place the fertile but almost inaccessible plains of north-eastern Africa in communication with the Indian ocean and the Mediterranean.

PATENTS, ARTS, AND SCIENCE.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Del.]

IT is a matter of congratulation among all true friends of science to learn that the Copley medal of the Royal Society of London has been awarded to Dr. J. R. Mayer, of Heilbronn, Germany, for the distinguished services to modern science which have been rendered by the recipient of the honor. This eminent savan, one of the foremost and most enthusiastic advocates of the doctrine of the correlation of forces, was born in 1814. He was educated as a physician, and commenced the practice of his profession in the town of his nativity. In 1840 he made a voyage to Java, where, on being called upon to bleed a feverish patient, he observed with surprise that the venous blood of persons in the tropics was of a much brighter red than that of patients in colder latitudes. He was led by the train of his reflections on the subject to the investigation of natural forces, which he followed up with a perseverance and system entitling his conclusions to high consideration. His discoveries, and his connection with the more advanced views of this department of physics have already been alluded to in this journal. So thoroughly did Mayer devote himself to the investigation of the phenomena of the natural forces, that his mind was unequal to the strain, and he temporarily lost his reason. He was confined in a lunatic asylum, where he was subjected to many indignities; but, through the instrumentality of his sister, he was removed from the tyranny of the establishment, and cared for privately, under which method of treatment he recovered, and for some time afterwards he devoted himself to the culture of the vine. For a time the honor of first announcing the discovery of the mechanical equivalent of heat was claimed both by Joule, of England, and Mayer. The merits of each of these original investigators are great, and each had hosts of friends ready to press the claims of the respective contestants. With a characteristic feeling of chivalry, Prof. John Tyndall, although a countryman and friend of Joule's, warmly advocated Mayer's claims; while admitting, at the same time, the highly meritorious services of Joule. The true state of the case seems to be that each of these experimenters announced the result about the same time; and although they reached substantially the same conclusion, yet they had worked entirely independently of each other, and had pursued widely opposite methods of investigation. Mayer is undoubtedly one of the foremost scientists of the age, and the award to him of the Copley medal is a graceful tribute, and a recognition of the great ability which has characterized his numerous researches.

—THE fact that in the vicinity of the Chincha Islands the anchors of ships frequently bring up guano from the bottom of the sea is considered by Prof. Edwards to prove the generally accepted belief that guano was formed from the excreta of piscivorous birds, to be incorrect. It is stated that when those portions of the guano which are insoluble in acids are examined, they are found to consist almost entirely of skeletons of *Diatomacea*,

Polycrystina, and sponges, all of which are invariably of marine origin, and are sometimes identical with those now living in the ocean. These and other observations have led to the formation of a theory "that guano is an accumulation of the bodies of animals and plants, which, either by heat, by chemical action, or both combined, have had their organic matter converted into bitumen, while the mineral constituents have been preserved in those beautiful forms which make up the infusorial strata in various parts of the world."

The above quotation we make from an exchange. However ingenious may be this theory, and by whatever names it may be endorsed, facts of the strongest character are decidedly against it. Every one who has even the slightest familiarity with the guano from either the Chincha or Guanape islands is aware that the "organic matter" has not been "converted into bitumen," nor have the "mineral constituents" been preserved in the forms of infusoria. The total inorganic constituents of pure Peruvian guano amount to but about 85 to 87 per cent. of its whole weight. A few years ago it was but about 34 per cent., the remainder being moisture, volatile and organic matter. Furthermore, the analysis of guano reveals the fact that the percentage of silica and sand is less than 2 per cent. in the Chincha, about $8\frac{1}{2}$ in the Angamos, and in the genuine Ichaboe (from the coast of Africa) it was not more than 6 to 7 per cent. As the *Diatomacea* consist of silicious shells, it will be seen at a glance that guano cannot be made up of this species.

There is no necessity for constructing new theories to account for the existence or mode of occurrence of guano. Its origin is a matter of easy demonstration; for, to a certain extent, it is now being formed, although so great is the demand and so extensive are the shipments that the Chincha islands are already nearly exhausted. That it is composed of the excreta of sea fowl, together with their partially decomposed bodies, eggs, etc., was the opinion of the ancient Peruvians as far back as tradition and history can be traced. So important were these deposits considered, and so indispensable to the agriculture of the country were they believed to be, that stringent laws were enforced to protect the birds. During their breeding season no one was allowed, under penalty of death, to even visit the islands where the guano is found. Humboldt, who in 1804 first drew the attention of Europeans to the value of guano, well understood its origin; while the analyses of Fourcroy, Vauquelin, Klaproth, Sir Humphrey Davy, and other distinguished chemists, proved in the most indubitable manner that the immense deposits, which for half a century have formed a highly important article of commerce, have originated as above stated. In view of these facts, it seems that other theories have but little foundation, however positively they may be asserted, and whatever plausible arguments may be used to enforce their claims.

—KAOLIN, or porcelain clay, is a mineral which finds many uses in the arts, and has become an important article of trade, being extensively mined in this country and largely imported from England. To the superior quality of this clay which is found in China is due the excellence of the porcelain wares of that country. It is furnished by the decomposition of a granitic rock known to geologists as pegmatite, the constituents of which are mainly quartz and feldspar. A similar clay is found in Cornwall, England, and at St. Yriex, near Limoges, in France, which is the seat of a very extensive porcelain industry. Besides its uses in the manufacture of the finer descriptions of crockery, kaolin is quite extensively employed in other branches of business, where its use cannot be considered quite legitimate. Among these applications may be mentioned that of its being incorporated with the pulp in the manufacture of paper, for the purpose of giving body and weight to the latter. The accomplished editor of the Boston Journal of Chemistry has recently analyzed the paper upon which some of the prominent journals and periodicals are printed, and finds that in many of them large quantities of kaolin are contained. The English papers, which are usually considered examples of high art in excellence of typography and character of paper stock, are heavily dosed with kaolin; one of them, the

Science Gossip of London, containing upwards of twenty-one per cent., while the Chemical News is printed on paper containing more than seventeen per cent. We have frequently observed minute scales of mica in ordinary newspaper stock, which is contained in the commoner grades of commercial kaolin. In the preparation of the better varieties this is always removed. But so long as *terra alba* is restricted to the "improvement" of paper, we shall make no serious complaint; but when it may be purchased in almost any candy shop in the country, as an adulterant of sugar, it is time to raise remonstrances, as clay eating, however it may accord with the usages of savage tribes, ought not to be enforced upon an innocent public. We have been recently called upon to examine commercial samples of kaolin, which consisted almost wholly of ground plaster, so that the adulterant is often adulterated. Kaolin itself, when taken into the system, may possibly do no great harm, however repugnant the idea of eating it may be. But the tendency of plaster to form concretionary masses in the stomach and intestines is a matter of record. All adulterations of dietetic materials should be made penal offences, and laws against such frauds should be rigidly enforced.

—ONE of the most astonishing and repulsive exhibitions of vandalism which has ever been brought to our attention has recently been exposed in New York. Mr. B. Waterhouse Hawkins, a palæontologist of world-wide reputation, had been engaged by the commissioners of the Central park to restore the skeletons of some of the extinct animals of America—among them the celebrated hadrosauras—and in pursuance of his labors he had made commendable progress. The upright and intelligent board who authorized the restoration were replaced by a commission composed of creatures of the notorious "ring," which has so sullied the fame of the city, and who had no more appreciation of the labors of this eminent savor than would be entertained by a herd of cattle. One of the individuals constituting this commission ordered the restorations to be destroyed by means of sledge hammers, and had them carted away to a distance, and buried several feet beneath the surface of the ground. Some of the sketches and models thus wantonly ruined were of great value, and would have been highly prized in any other place. Mr. Hawkins was told by this person that he "should not bother himself about dead animals; that there was plenty to do among the living." Prof. Henry, of the Smithsonian Institution of Washington, when told of this piece of barbarism, was almost incredulous that in this century such deplorable ignorance should be exhibited. It is much to be regretted that the Central Park museum, which contains so many valuable specimens of natural history, should have been despoiled of the works of Mr. Hawkins in this manner.

—IN Dinger's Polytechnisches Journal an economical method of preparing dextrine has been proposed by O. Ficinus. A mixture of five hundred parts of potato starch, fifteen hundred parts of cold distilled water, and eight parts of pure oxalic acid is placed in a suitable vessel on a water bath, and heated until a small sample, tested with iodine solution, does not produce the reaction of starch. When this is found to be the case, the vessel is immediately removed from the water bath, and the liquid neutralized with pure carbonate of lime. After having been left standing for a couple of days the liquor is filtered, and the clear filtrate evaporated upon a water bath until the mass becomes a paste, which is removed by a spatula, and having been made into a thin cake, is placed upon paper, and further dried in a warm place. Two hundred and twenty parts of pure dextrine are thus obtained.

—A NEW method of removing the obstructions caused by accumulations of paraffine in petroleum wells has been proposed, in which oxygen gas is introduced into the bore, and the paraffine ignited. The light is applied to the parts nearest the surface, and the fire is allowed to descend as long as paraffine is present, when it is easily extinguished by stopping the supply of oxygen. This process is said to be much cheaper than the old one of blasting away the paraffine by means of explosives, and it is also claimed that it can be much better regulated, but of the validity of these claims we entertain strong doubts.

—A NUMBER of devices have been suggested for rendering linen and cotton goods water-proof. The following directions by H. Kuhr are said to effect the object in a very complete manner. The material is taken successively through a bath of sulphate of alumina, of soap, and of water; it is then dried, and smoothed, or calendered. For the alumina bath the ordinary neutral sulphate of alumina (concentrated alum cake) is used, dissolved in ten parts of water. The solution is easily effected without the aid of heat. The soap is best prepared by boiling one part of light rosin, one part of soda crystals, and ten parts of water till the alum is dissolved. The soap is then salted by the addition of one-third part common salt, and is dissolved with an equal amount of good palm-oil soap in thirty parts of water. The soap bath should be kept hot while the goods are passing through it. It is best to have three vats alongside of each other, and by a special arrangement to keep the goods down in the baths. Great care should be taken to have the fabric thoroughly soaked in the alumina bath. On the authority of Drs. Hager and Jacobsen, it is stated that during the past few years very good and cheap water-proof goods of this description have been manufactured in Berlin, which they believe is effected by steeping them first in a bath of sulphate of alumina and of copper, and then in one of water-glass and rosin soap.

—A PHYSICIAN of St. Petersburg, Dr. Manassein, has recently investigated the physiological action of the human blood when subjected to abnormal influences. Under various conditions of the system, caused either by elevation or depression of temperature, or by the action of different medicaments, the size of the blood corpuscles varies considerably. In nearly all his researches an augmented temperature of the body caused a diminution in the size, while, on the other hand, a decreased temperature enlarged them. An injection of putrid matter into the system, or an excess of carbonic acid in the air inhaled, or other conditions promoting a febrile state in the patient, all promote a contraction in the corpuscles. The inhalation of oxygen and the exposure of the body to cold produced an increase in their size; as did also treatment with alcohol, hydrochlorate of quinine, and cyanic acid, which all have a tendency to reduce the temperature of the body. Although a general regularity was observed, and a parallelism exhibited between the action of cooling substances which enlarge and heating substances which contract the size of the corpuscles, an exception was found in muriate of morphia, which, while it depresses the warmth of the body, decreases the size of the corpuscles—a fact which Dr. Manassein explains on the hypothesis that this compound restrains the respiratory process, and thus facilitates the retention of carbonic acid in the blood.

—AN alarming increase in the consumption of hydrate of chloral points to the fact that it is being used in the most reckless manner. It is superceding abstinence, opium, and alcoholic stimulants; and while its action is so insidious, its use grows more dangerously than the more actively intoxicating drinks. In Europe the manufacture of this article has increased enormously. Liebig says that a single establishment in Germany produces half a ton per week; while, according to the London Spectator, "taking chloral is the new and popular vice, particularly among women, and is doing at least as much harm as alcohol. The drug is kept in thousands of dressing cases, and those who begin to use it often grow so addicted to it that they pass their lives in a sort of contented stupefaction. Chloral drunkards will soon be an admitted variety of the species."

—EXPERIMENTS have been recently made by Ditte with a view of determining the relative amount of heat generated by the combustion of some of the metals. The following are among the results he obtained:—

	<i>For one grain.</i>	<i>For one equivalent.</i>
Magnesium	6.180.5 units of heat.	73.568 units.
Zinc	1.857.6 " "	44.248 " "
Indium	1.044.6 " "	37.509 " "
Cadmium	271.1 " "	15.231 " "

—In a recent communication to the Astronomical Society of England, Mr. Proctor announces his belief that the spots on the sun are the effect of volcanoes, roused into activity by the relative proximity of the planets. He argues in support of this view, from the fact that earthquakes and volcanic eruptions occur most frequently on our globe when the moon is nearest to us. Even the small changes produced by tidal action were supposed by the late Sir John Herschel to have an exciting effect on volcanoes on the coast. "And if," says Mr. Proctor, "the mightiest of the planets sympathizes with solar action—if, when the sun is most disturbed, the belts of Jupiter are also subject (as of late and in 1860) to strange phenomena of change—how readily do we find an explanation of what would otherwise seem so mysterious, when we remember that, as Jupiter disturbs the mighty mass of the sun, so the sun would reciprocally disturb the mass of the largest of his attendant orbs." Another view of the solar question was suggested by the astronomer-royal of Scotland to the board of visitors of the Edinburgh observatory, in a recent address, in which a correspondence is traced between the sun-spot period and the cycle of temperature as shown by the underground thermometers in his charge. At Toronto, the observer believes he has ascertained that a connection exists between the annual rainfall at that place and the sun spots; while in other localities coincidences in other phenomena are announced. From these facts it is probable that local meteorological observations will be made with special reference to the periodical appearance of the spots.

—A PATENT has been recently obtained by George A. Drummond and Dr. T. Sterry Hunt, of Montreal, for an improved process of refining sugar, whereby iron or other metallic impurities may be removed by the agency of the monosulphide of calcium, strontium, or barium, together with that of sulphate of magnesia. The iron or other metallic impurity which may be contained in the syrup is precipitated as an insoluble sulphide, while the subsequent addition of the sulphate of magnesia converts any excess of the sulphide into sulphide of magnesium, which is very unstable; while if barium sulphide be used, it is converted into an insoluble sulphate, which, together with the sulphide of iron, may be easily removed by filtration. In applying this process on a working scale, milk of lime is added to the syrup, to slight alkaline reaction, when the sulphide is mixed with it, preferably dissolved in water, the temperature of the whole being maintained at 100° to 150° Fahrenheit. If the solution gives a dark color to lead test-paper, the quantity of sulphide which has been added is sufficient; if not, more must be used. The mixture is then treated with a solution of sulphate of magnesia, at the rate of one and a half pounds to every pound of sulphide of barium, or for every half pound of sulphide of calcium. This process is said to be very efficacious and easily applied. The name of Dr. Hunt, one of its patentees, is sufficient to entitle it to the most respectful consideration.

—DR. SEPTIMUS PIESSE, who is well known as a successful cultivator of delicate and fragrant flowers used in perfumery, has suggested the use of paraffine as an agent to preserve fruit and flowers, by dipping them in a bath of the melted material. On promptly withdrawing them, they will be found to be coated with a thin film of paraffine, which perfectly protects them from the air and prevents their decay. To perform the operation, the paraffine should be heated just sufficiently to melt it to a clear liquid. The flowers should be held by the stalks, and dipped in separately, and slowly moved about in the melted bath, so as to displace any bubbles of air which may have adhered to the flower. Fruit should be dipped in the same manner. Paraffine is perfectly impervious to air; and as it resists all disposition to undergo decomposition, it possesses properties which render it exceedingly useful in the arts.

—A NEW method of preparing sulphuretted hydrogen has been proposed. By heating a mixture of equal parts of sulphur and paraffine in a flask to a temperature not much above the melting point of the sulphur, the gas is evolved with great steadiness. The production may be stopped or renewed at pleasure by simply withdrawing or applying the lamp.

—ACCORDING to a recent report, Puscher has devised a method of coating metallic objects with a black-brown varnish. On the bottom of a cylindrical cast-iron vessel, eighteen inches high, is placed a layer, one-half inch thick, of bituminous coal dust; upon this is placed an iron grating, upon which are put the iron, steel, or other metallic objects intended to be coated with the varnish. The vessel having been first covered with a well-fitting lid, is next placed on a bright coke fire and heated for about a quarter of an hour to an incipient red heat. It is then taken off the fire, and on the lid being removed, after about ten minutes, the metallic objects will be found coated very uniformly with a good and durable varnish, which resists bending, as well as a high temperature, without cracking or coming off. Very small objects—such as hooks and eyes, for instance—are better placed, along with some coal dust, in a coffee roasting apparatus, and this is turned, as in the roasting of coffee, until the metallic objects have obtained the desired depth of color and are uniformly coated with the varnish.

—WE have alluded to the desirability of a prompt and easy way of estimating sulphur and phosphorus in iron. A process has been devised by K. Meineke, in which he dissolves the finely pulverized iron in chloride of copper, separates the reduced copper by treatment with an excess of chloride of copper and common salt, and filters through asbestos. The insoluble portions adhering to the asbestos are washed into a beaker glass, and oxidized by concentrated nitric acid and chlorate of potash. It is then evaporated with hydrochloric acid, and the sulphur determined by chloride of barium, while the phosphorus is estimated by means of molybdate of ammonia, these elements having been converted by oxidation into sulphuric and phosphoric acids, respectively. The author of this method claims some advantages over the way which has been hitherto employed. One decided improvement is said to consist in the greater ease with which the solutions may be filtered, while it is asserted that the results are more accurate than those otherwise obtained.

—IT is announced that aluminum may be deposited upon metals by means of electrolysis. Mr. J. Baynes Thompson has communicated to the Chemical News the fact that for more than two years he has been depositing aluminum daily on iron, steel, and other metals, and driving it into their surfaces at a heat of about 500° Fahrenheit, in the same way as he does silver and nickel. He also claims to produce the same results with aluminum bronze, of various tints, from the palest lemon to the richest gold color. Dr. Gore, of Birmingham, some years ago claimed to be able to plate metals with aluminum, but as neither of these experimenters seems to have demonstrated his success on a large scale, further developments must be awaited ere their statements can be accepted.

—A DURABLE cement, capable of resisting the action of strong acids, has long been a desideratum. According to the Chemical News, if caoutchouc be melted with from six to eight per cent. of tallow, and to the fluid mass dry slaked lime be added to the consistency of a soft paste, and lastly, twenty per cent. of red lead be incorporated with the mixture, it soon becomes hard and dry, and it is stated that it will even resist the action of boiling sulphuric acid. A solution of caoutchouc in twice its weight of raw linseed oil, to which is added an equal weight of pipe-clay, furnishes a plastic mass which also resists most acids.

—FROM the leaves of an exotic plant known as the *Coleus verschaffeltii*, M. Bottger has produced a highly sensitive test-paper for alkalis, which is said to be far more delicate than either turnsol or turmeric. The reagent is prepared by digesting the leaves of the plant for twenty-four hours in absolute alcohol, to which a few drops of sulphuric acid have been added. The color is a brilliant red, which, when treated with an alkali, turns to a fine green tint. It is not affected by carbonic acid, and its delicacy is such that it will indicate the presence of minute traces of the carbonates of the alkaline earths in natural waters.

MONETARY.

THE financial tone of February has been far from cheerful. A drain of specie through unusually large customs payments and out-of-town demand for currency, have forced the banks to contract their dealings. The chief cities show a poverty of bank resources as against demand liabilities. In New York and Philadelphia the aggregate surplus reserve has gone down weekly, and with lessening deposits. On the 24th the New York associated banks had an excess of but \$2,590,525 over required gold and legal tenders, against \$18,403,066 February 25, 1871. Some Philadelphia banks are below the legal reserve. The comptroller of the currency calls upon all national banks of the country to show their condition at close of business on the 27th of the month.

Further disclosures as to fraudulent management of some New York savings banks have taken place. In respect to the Market a far worse condition is shown than the first reports represented—defalcation of cashier, etc., etc.

—Sales of Stocks, etc., at New York.

	Jan. 29.	Feb. 5.	Feb. 12.	Feb. 19.	Feb. 26.
U. S. 6's, coupon, 1881.....	115½	115½	115½	115½	115½
“ 5-20's, coupon, 1862.....	110½	110½	110½	110½	111½
“ 5-20's, coupon, 1864.....	110½	110½	110½	110½	111½
“ 5-20's, coupon, 1865, m & n.....	111½	111½	111½	111½	112½
“ 5-20's, coupon, 1865, j & jy.....	110½	110½	110½	110½	110½
“ 5-20's, coupon, 1867.....	112½	112½	111½	111½	111½
“ 5-20's, coupon, 1868.....	112½	112½	112½	112½	112½
“ 10-40's, coupon.....	110½	110½	110½	110½	110½
Pacific 6's, currency.....	115	114½	114½	114½	114½
Tennessee 6's.....	65½	65½	66½	66½	67½
“ 6's, new.....	65½	65½	66½	66½	67½
North Carolina 6's.....	82	82½	82½	83½	84½
“ 6's, new.....	15½	16	17½	18	18
Missouri 6's.....	94	94½	94	94½	95½
N. Y. Central and Hudson R. con.....	97½	98½	97½	97½	97½
Harlem.....	117	116	109	111½	110
Erie.....	82½	80½	80½	81½	81½
Lake Shore and Michigan Southern.....	90½	91½	89½	91½	92½
Wabash.....	74½	76½	76½	75½	76½
Cleveland & Pittsburgh.....	91½	91½	91½	90½	90½
Northwestern.....	72½	74½	74½	78½	77½
“ preferred.....	91½	91½	90½	91½	91½
Rock Island.....	110½	112½	110½	111½	111½
Fort Wayne.....	97½	97½	97½	98	98
Milwaukee and St. Paul.....	55½	56½	55½	55½	57
“ preferred.....	74½	74½	70½	75½	76½
Ohio and Mississippi.....	46½	46½	44½	44½	44½
New Jersey Central.....	111½	111½	110½	111½	110½
Western Union Telegraph.....	72½	72½	70½	68½	69½
Pacific Mail.....	56½	59½	57½	57½	58½
Union Pacific.....	87½	88½	85½	86½	84½
Adams Express.....	91½	92½	98	98½	91½

	Jan. 29.	Feb. 5.	Feb. 12.	Feb. 19.	Feb. 26.
Wells, Fargo & Co. Express.....		65½	65	....	74
American Merchants Union Ex.....		61½	63½	68½	68½
United States Express.....		64½	63½	65½	66½
Rate for Money.....	7	6	6@7	6@7	7@..

Sales of Stocks, etc., at Philadelphia.

Gold.....	109½	110	110½	110½	110½
Sterling exchange.....	119½	119½	120½	120½	121½
Paris exchange.....	4.82	4.80	4.78	4.77	4.72
Lehigh Valley Railroad.....		62	62½	62½	62½
" " 6's.....	94	95½		95½	95½
" " 7's, reg.....	108½	103	108½	108½	100½
Lehigh Navigation.....	89½	40½	89½	40½	89½
" " 6's, 1884.....	89½			89½	89½
" " 6's, g ln.....	93	98½	93		92½
" " 6's, R.....	93½	98		93	93
City 6's, no tax.....	97	100½	100½	100½	100½
" tax.....	100½	97	97	97	97
Pennsylvania Railroad.....	60½	62½	61½	64½*	63½
" " 6's, 1m.....	100½	100½	102	101½	101
" " 6's, 2m.....	99½	99½	99½	100	100
Pennsylvania 6's, w ln.....					100
" " 6's, first ser.....	101½	101½		101	
" " 6's, second ser.....	106½	106	106	106	
" " 6's, third ser.....		108½		108½	108
" " 5's, cp.....					
Reading Railroad.....	57.44	57½	56½	56½	56.94
" " 6's, mt.....	92½	92	92½	92½	93
" " 7's.....	100	100	100½	100½	100½
Catawissa Railroad.....	16	16			
" " preferred.....	46½	47	46½	46	46½
New York and Middle.....	4	4			
North Pennsylvania R. R.....	47	48½	48	48	49
" " 6's, mt.....	98½	98	98	99½	99½
" " 7's, mt.....	96	96½	96	96½	96
" " 10's, chat.....					
Camden and Amboy R. R.....	126½	126	126	125½	125
" " 6's, mt, 1889.....	96½	96	96½	95½	96
" " 6's, 1883.....	92½	90	90½		91
" " 6's, 1889.....	89½	89	90	90½	91½
West Jersey Railroad 6's.....	90½	92½	92½	92	92½
" " 7's.....	102½	102½	102½	102	102
Philadelphia and Erie.....	26½	26½	26	26½	26½
" " 6's.....	91	92		91	91½
Allegheny County, 5 cp.....	78	78		78	78
Schuylkill Navigation.....	8½	8½	8		8
" " preferred.....	17½	16		16	16½
" " 6's, 1882.....	79	79	79	79	79
Morris Canal.....	49				
" " preferred.....	124½	124			
" " 6's, 1882.....	92½	93	93	93	93
Little Schuylkill Railroad.....	45½	46	45½	45½	45½
Oil Ck. and Al. R.....	44	42½	42	41	38½
" " 7's.....	82½	82½	82½	82½	
Phila., Ger., and Nor. R R.....	87		87½	85½	85
Minehill Railroad.....	52½	52½	53	53	53½
Elmira and Williamsport, preferred.....	40	41	40	42	41
" " 7's.....		94		94½	94½
" " 5's.....	60½	60½	60½	60½	60½
Northern Central.....	40		89	89	89
Fulton Coal.....			5		5½
Big Mountain.....					
Rate for Money.....	6	7	6@6½	6@7	7@7½

* New stock allotment.

NOTING AND COMMENTING.

THE opening of parliament on the 8th of February precipitated the crisis in the English feeling upon the presentation, under the Washington treaty, of the claim on behalf of the United States for what are known as "indirect damages." Had the views of her majesty's ministers been expressed in no stronger language than was employed in the speech from the throne, it would have been comparatively easy to have adjusted the misunderstanding between the two governments. Unfortunately, however, Mr. Gladstone suffered himself to be stung by the taunts of Mr. Disraeli into one of those intemperate and ill-timed utterances for which his irritability has rendered him famous, and which has committed the ministry to a difficult and not very pleasant line of policy. In all the confusion that has arisen as to the construction of the treaty in reference to the admission of claims of this nature, one thing is very clear—viz., that unless the United States commissioners were guilty of the trick of using language in one sense with the full knowledge that the English commissioners were using the same words in a widely different sense, the United States is justified in insisting upon their presentation. The objection that we ought not to press these claims because we do not expect to have them allowed is one of those foolish and ignorant trivialities that hardly deserve refutation, except for the position of the persons who are guilty of them. Unless these claims are presented to and decided by the Geneva commission, one of the serious causes of dissension between the two countries will remain unaffected, and the treaty will have done but half its work. The tone of the English press in relation to the controversy has been virulent and narrow, not treating the subject from an international point.

The recovery of the prince of Wales was celebrated with great pomp on the 27th. It has been so long a time since the English shopkeepers have been indulged in a civic display that they have naturally made much of the occasion.

The brutal murder of Earl Mayo, governor-general of India, by a Mohammedan convict, was officially announced February 8th. On the evening of the 19th a vote was reached in the

house of commons upon the resolution of censure upon the ministry for the appointment of Sir Robert Collier to the privy council. The ministry sustained itself by a majority of only 37, in a vote of 241 ayes to 238 nays. Antwerp has been made the scene of the meeting of a large number of legitimists, whose object in thus coming together is one of those mysteriously unimportant things that in all likelihood will never be discovered. The good people of Antwerp seem to have been greatly outraged at the selection of their city for the purpose—whatever it may have been—and to have resented it in the practical shape of a riot. The latest advices announce the departure from the city of the Count de Chambord.

From France there has been nothing of importance, excepting the attempt to fuse the legitimist and Orleanist parties. The terms of the proposed union are kept secret. The statement that the pope has addressed a circular letter to the French bishops asking their support for the Count de Chambord is probably untrue. Nothing more absurd than papal interference in the internal affairs of French government could be imagined; and the papal government, in spite of certain recent ecclesiastical statements, is not apt to be absurd in its foreign policy. The navigation tax bill of M. Thiers has met with a hard fate in the assembly. Not only did the assembly exempt colonial produce—ships carrying guano—and importing corn, but it was discovered that by the treaty of 1866 most of the maritime powers were not subject to any import duties until after 1873.

Germany is said to be arming herself once again—though the only object in doing so that has as yet been suggested is the possibility of an overthrow of the Thiers government and the substitution of some other form—the empire is mentioned—not as agreeable to Count Bismarck. But the ways of that statesman, like those of the serpent upon the rock, are past finding out. Just at present all the European powers are upon such delightfully friendly relations that a general armament by any one of them seems at once unkind and unnecessary. Nevertheless, two full corps of the imperial army are said to be under marching orders, and the army generally is getting ready—for what, no one knows.

Everything in Spain continues in a condition of the greatest confusion, and it is not difficult to believe the rumor that King Amadeus has expressed his disgust of the Spanish character and his desire to abdicate. The new ministry of Sagasta has five members of what is known as the Unionist party—with Malcampo and de Blas. But the tone of public opinion is deplorably low, and it is to be feared that the nation has much to learn before it can master that outcome of a free people only—a free government. The impression is quite general that a governmental crisis has now been reached, and that the necessary change must be a radical one.

The Russian affair has been completely lost sight of in the excitement attending the Alabama difficulty. M. de Catacazy has gone quietly home, and Baron von Offenberg—his successor—is en route for Washington.

The report of the total destruction by an earthquake of the town of Schamachi, in Waus Caucasia, is confirmed.

From Cuba we have the rather unexpected intelligence, from the captain-general of the island, that in a recent tour through the interior he ascertained that the insurrection was nearly crushed. In his report to the home government he asks for only two thousand troops, and promises to completely restore the Spanish rule by the coming April at farthest.

—The committee of ways and means of the Federal house of representatives have had a conference with a delegation of silk manufacturers and operatives from Massachusetts, Connecticut, New York, and New Jersey, in respect to the matter of retaining the present tariff protecting this interest; i. e., 60 per cent. on imported manufactured goods, raw material free. Specimens were exhibited of manufactured silks of all kinds, but dress goods, showing in part the progress of the American manufacture both as to quality and variety. The silk men say that under the advantages afforded by the present tariff, aided as it is by the operation of the Anglo-French free trade treaty, this industry has grown fast. Capital invested has increased from \$3,000,000 to \$25,000,000, which affords employment for 16,000 operatives, three-fourths of them women and young persons, for whom such occupation is specially adapted, it being clean, light, and healthy. The wages paid these operatives amount to \$7,200,000 per annum, being a weekly average (30 hours) for women of \$7, and for males \$12. One-third of these operatives are immigrants from Europe, and have become teachers of our native-born operatives. As compared with the above, the wages paid in the Austrian Tyrol for the same kind of work is from ninety cents to one dollar for sixty-nine hours' work, the operatives having poor shelter and food, for which each pays forty-five cents a week. The delegation admit that silk goods are higher than before 1861, but this is mainly owing to the fact that all raw silks in the countries of production are now more than double the price they were immediately before 1861.

—In the annual report of the trade and commerce of Chicago, compiled by the secretary of the board of trade of that city, it is stated that during the past year the receipts were as follows: Flour, 1,412,177 barrels; wheat, 14,499,656 bushels; corn, 41,863,153 bushels; oats, 2,011,788 bushels; barley, 4,096,410 bushels; wool, 27,036,631 pounds; hides, 25,026,084 pounds; lumber, 1,030,338 feet; cattle, 543,050; and live hogs, 2,380,083. During the same time the shipments were as follows: Flour, 1,287,574 barrels; wheat, 12,905,449 bushels; corn, 36,716,030 bushels; oats, 12,151,347 bushels; rye, 1,325,867 bushels; barley, 2,908,113 bushels; wool, 24,351,524 pounds; hides, 22,462,864 pounds; lumber, 541,223 feet; cattle, 401,927; and live hogs, 1,162,398. With the exception of wheat the report shows that the various receipts were considerably larger than during the previous year. The quantity of wheat received during 1870 was 17,804,409 bushels, an excess of 2,054,783 bushels over the quantity received during 1871.

—The nut and machine bolt manufacturers of the United States have met in New York and effected a permanent organization. A committee, appointed for the purpose, reported in favor of the name of The Association of Bolt and Nut Manufacturers of the United States; and for permanent officers the following: President, J. H. Sternbergh, of Reading, Pa.; secretary and treasurer, H. B. Newhall, of New York. The report was concurred in by the convention. Two committees were appointed to fix a standard scale of prices, one on nuts and washers, and the other on bolts, who reported a scale at an adjourned meeting, which was approved, and the secretary was directed to have the same printed and circulated among the trade. These committees represented the manufacturers of Cleveland, Pittsburgh, Philadelphia, Providence, N. York, Buffalo, Lowell, Mass., Pawtucket, Unionville, Conn., and Youngstown, Ohio.

—The whale fishery off the coast of San Diego (Cal.) is prosecuted with considerable success. "Since our last report," says the San Diego Union of Jan. 11, "five whales have been caught so far this season, whose aggregate yield of oil will amount to 230 barrels. Whales are now seen nearly every day outside the heads, sometimes in schools and often singly. On Saturday last 15 were observed at once. On this day a large bull was harpooned, which gave its captors considerable trouble. Two others were fastened to, but escaped. The day previous a good-sized bull was taken. On Sunday a large cow whale and calf were captured; the calf being worthless for oil-making, was allowed to float away. The cow was a fine catch; its blubber will not yield less than 75 barrels of prime oil."

—The wool manufacturing industry of England embraces 1,550 factories, 10,463 carding, and 488 combing machines. They operate nearly 2,000,000 spindles and 33,792 power looms. The number of hands employed is 100,640, of whom 53,811 are males and 46,829 females. The worsted mills number 559, running 991 carding, and 848 combing machines. They work 1,900,000 spindles and 34,739 power looms. They employ 103,514 hands, of whom 40,456 are males and 63,058 are females. The wool industry of the United Kingdom supports upwards of 1,000,000 of people.

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THE CONSTITUTIONAL CONVENTION OF PENN- SYLVANIA AND ITS WORK.

THERE has been of late years a growing sense of the defects in the constitutions of the several States of the Union, and of the necessity of some radical change in them. Although to some extent differing one from the other—there is still a resemblance between these constitutions so marked and distinct as to show how closely analogous are the principles upon which they are founded. And it is for this reason that a constitutional convention of any one State is always a subject of great moment for the others. Not only must the constitution of every State conform to the general regulations of the Federal constitution, whose power, though limited to the strictest construction of the original grant, is still supreme in the exercise of any such delegated authority, but the system must also conform as far as may be possible to those of the sister States. The governmental and commercial relations of the several State sovereignties are so closely interwoven that no one of them can afford to base its constitution upon antagonistic or materially different principles. It would seem as though each advance in civilization involved an increased degree of complexity in the form of government, and the world has never seen a more complex or elaborate governmental system than that of the United States. Resting in its general scope upon a few grand principles, it necessarily embraces and extends to a vast combination of details. Whilst the Federal constitution holds the

State sovereignties in their appointed orbit around the general government, there is a still higher law—a law of national growth—that binds together and makes move in accord the States themselves. Thus we see that every modification in the constitution of one State insensibly, but materially influences those of all the rest. The extinction of polygamy in Utah—not by force, but by the general development of the community under the influence of the ideas of morality working through the jurisprudence of neighboring States—was something to be foretold with nearly the same degree of certainty as the action of one known chemical material upon another.

It is the design of this article to point out in as brief a manner as possible some of the evils existing in our present constitution, and the remedies proposed in some—and actually carried out in others—of the States of the Union. Only a few of these evils can be mentioned within the limits of this Review, and those few will be those which are not generally felt, rather than those with which the public are by sad experience only too familiar.

The amended constitution of Pennsylvania, of 1850, provided for an elective judiciary. The amendment itself was one of the results of that unfortunate movement in the direction of making all offices elective that had just swept over the length and breadth of the country. Experience has shown the error of the movement, and the results of this amendment constitute a fair instance of the mistaken principle upon which it is founded. The original theory of the constitution of our judiciary was that it was imperatively necessary that the bench should be lifted beyond the arena of political strife; nay, more—should be separated by an impassable gulf from any direct interest in the results of party victories or defeats. In carrying out the design, two things were necessary: first, to make the judges independent of any political considerations by giving them a life tenure, and holding the executive responsible, in a political sense, for their appointment; and secondly, by investing the office with accompanying dignities and pecuniary ease sufficient to make it an object of ambition to really great lawyers. Curiously enough, whilst no one has ventured to controvert the theory itself, public opinion has suffered itself to drift into a belief that no measures are necessary to secure a competent and upright judiciary. One by one the guards that kept corruption from the bench have been abandoned. Short terms, to which the occupant is elected by a popular vote, and a salary so small that but few ordinarily successful lawyers can afford to accept the position, have been substituted for the wiser provisions of our forefathers. Instead of a place upon the bench being made the legitimate object of the ambition of the bar, it has been ren-

dered one, the acceptance of which is a sacrifice to a great lawyer, and desirable only to one of less capacity.

And this evil is not confined to the judiciary: it is one that extends to almost every branch of the public service. In every department of government we see the same folly—that the government, by some mysterious superiority to natural laws, can procure competent servants at less than their cost. The scriptural maxim that “the laborer is worthy of his hire” has been entirely disregarded, and the nation has persisted in the insane belief that it could attract to its employ servants of the greatest ability and integrity at a rate of compensation far less than the same degree of integrity and ability could obtain elsewhere. There is hardly an office of importance whose legitimate earnings are sufficient for the support of a man of good social station without most careful economy on his part; none where the salary is large enough to attract a man of a very high grade of ability. The nation and the several States—there are one or two exceptions only—pay for their clerical and menial work at very liberal rates, but for all classes of services demanding brain-work and skilled thought they pay prices that cannot bring, and have not brought to their services the most competent class of agents.

If this evil of inadequate salaries stopped, either with the judiciary or the agents of the other branches of the government, at the point of giving us an inferior grade of public servants it would be, although grave enough, nothing comparably as bad as its ultimate effect upon the honesty of officials. It has been the often-told story of experience that, if you give a man an insufficient amount of food, together with almost unlimited opportunities for procuring food in any quantity in *illegal* ways, he will first take by fraud all that is necessary for a most luxurious living, and then he will take as much more for his friends. Our fashion of doing things in this particular is very analogous, and no whit more reasonable than that of a man who would refuse to give his servants enough to support life, and then expect them not to steal, whilst he had carefully afforded them every facility for doing so.

There is another evil—the growth of later years—that threatens to be very difficult of removal, and that is the existence of a class of unlettered judges for cases of small amounts, whose earnings are the costs they impose upon suitors before them. The old principle of the system of English justices of the peace has been burlesqued in this country in a fashion that would be laughable were not its effects so serious. The English system created the office for men—noblemen, for the most part—of the largest influence in their respective counties, so that in trifling disputes their personal character might assist in a settlement or enforce an adjudication. For their services they received nothing. There is,

of course, no similar class in this country. No set of men, however patriotic, can afford to give habitually or regularly their time to public work without compensation; nor have we any race like that of the English squires, where for generations sons succeed their fathers, until a proper exercise of the office is hereditary. Our justices of the peace are, on the other hand, dependent upon their office for their livelihood, and the honest returns of such an office are so small that only an incompetent or a crafty man will accept it; and then, to crown our work, we give them nothing but what they can collect from their suitors in the shape of costs.

Inconsiderable as this seems to be—and in many parts of the country really is—it was wisely said by the New York convention that the principle contained in it was one whose full application would destroy all civil rights; for to make judges directly dependent on costs incurred before them is to deprive their judgments of all public confidence. The old French judiciary was supported by gifts from suitors. It disgraced France, and helped to draw it into revolution and anarchy. Men cannot believe in the honesty of an opinion on that side that gives its writer fees, when, were it on the other side, he would get none. New York and Illinois have led the way in this by requiring every person, whose office is in any sense judicial, to be a person learned in the law, and giving him sufficient compensation from the public treasury.

Two of the most important questions of constitutional reform are those relating to compulsory education and the organization of departments of health, with the power of visitation, compulsory vaccination, disinfection, etc. Both of these measures are open to grave objections, and yet may be supported by strong arguments. The result of their introduction into Prussia has shown the practical working of both to be highly advantageous. Whether they would be so amongst a people not used to that continual interference by a gendarme in every affair of life, which to a German seems rather pleasant, is a difficult question. But, to some extent, we must have an educational and hygienic regimen that shall not be optional. The ravages of the small-pox, by which hundreds of lives were lost to the State, and the business of several communities very seriously injured, were demonstrably avoidable by a thorough and general vaccination, to which, however, unfortunately, a large proportion of the ignorant classes would not willingly submit. In many other ways it may be shown that there exists a necessity for a body of men charged with the duty of providing, and armed with sufficient authority to carry out, general regulations for the health of the large cities. The organization of such bodies we have now, but their authority is too limited to enable them to be of much practical utility.

In a recent number of the *Exchange and Review* something was said of the necessity of reducing the number of elections and of officers to be voted for, and supplementary to this is the need of a civil service department from which the unelected officers can be chosen. It is not possible to recapitulate here the arguments for a civil service. The certainty that such a department would deprive local politicians of their occupation is of itself almost sufficient to demonstrate the desirability of the measure. But there are certain practical guards against inefficient and corrupt governmental administration that are in danger of being overlooked. Thus it has been suggested that the ratio of representation in our legislatures should be largely increased, so that no district should be at the mercy of one man. The present evil is, that in governing the different interests of our enormous territory, the legislature almost necessarily relies upon the statements of the local member in framing any measure designed to operate particularly upon the section he represents, and thus that member is constituted so entirely master of the situation that his demands for procuring any legislation become extortionate. When there are two members, each acts upon the other as a check. An increased representation in our legislatures might also do something towards limiting the special legislation that has grown to be one of the great curses of our system. None but a lawyer, and he but imperfectly, can realize the confusion and uncertainty arising from the hundreds of special acts for every little section, that are poured in a continuing flood from every legislature in the land. One of the causes of the evil is the limited representation, which gives too large a power to individual members, who exercise it without running the gauntlet of any criticism except that of a perhaps distant constituency, and then only upon their political votes.

Among other subjects with which the attention of any constitutional convention should be occupied is the revision of the laws regulating the organization and conduct of corporations. For many years past the conduct of large business interests has been tending away from the old plan of partnerships. The dreadful risk assumed as the basis of all partnership relations—viz., that all the property of all the partners is liable for the firm debts, with its accompanying danger of reposing in each partner the power of binding the others as to third persons, and the additional danger, to which every partnership is necessarily liable, of having the business stopped suddenly without warning by a discontented partner—have combined to drive men into other forms in which capital can be employed with greater safety. In all the States the plan of limited partnerships has been introduced and faithfully tried. The difficulty that inheres, however, in that plan—viz., that if the liability

of a partner is limited, he is deprived of any control of the firm operations—has proved a fatal one. Nothing has so well answered the great purpose of aggregating capital as corporations; and when it is remembered that combined capital has a vastly multiplied power over the same capital segregated, and that with all our wealth the nation needs, and needs imperatively, still more capital to develop her resources, it must be apparent that no fetters should be put upon, or no embarrassments thrown around, any legitimate combination of capital. The advantages of the corporation system are manifest; the evils are the result of unwise legislation. There is no reason for the high rate of taxation to which private corporations are subjected, or for the officious interference with their books by government agents, who are thus put in possession of facts whose publicity might seriously injure the company. The distinction as to this between public corporations, or those whose franchise is for a public trust, and private corporations, whose only franchise is the franchise of being a corporation, has been lost sight of. Some right of inspection of the operations of the former is necessary and proper to secure the public trust; but the reason entirely fails as to private corporations, and its application to them is unjust in theory and oppressive in exercise.

A UNIVERSAL LANGUAGE.

IT long ago occurred to us, says Chambers's Journal, that the time had arrived when individuals and nations should endeavor, as far as in them lay, to remedy the disaster caused long ago by the presumption of the ancients. Without speaking irreverently, we may question whether the confusion of tongues which stopped the building of the Tower of Babel, might not in the present age be made less confusing, and in a great measure be done away with. It is true that we have known people who would never attempt to learn any other language than that belonging to the country in which they were born, because, they urged, it would be attempting to defeat the ends of Providence. A very large majority of persons, however, think differently, and believe that they could work better, think better, and be more generally useful, if they could freely and readily express their thoughts and wishes in several tongues.

A want of knowledge of a language at once brings the philosopher and the fool very much on a par, when they both attempt to communi-

cate with the foreigner who speaks that language alone. Also, if a stupid person speak a foreign language well, and a clever person speak it badly, the stupid person has the better chance of telling most to the foreigners, whilst the clever person is like one that is dumb.

From a very considerable experience in connection with education, we are convinced that it requires a very small amount of brain-power to be a good linguist. It requires ear and a sort of parrot-like method of imitation; but it does not require reason, or deep thought. In fact, there are so many absurdities in connection with languages, so much that is merely arbitrary both in construction and in other details, that the reasoner is often stopped, where the thoughtless will advance rapidly. Let us take a few examples in connection with masculines and feminines in French and German. The French have but the masculine and feminine, whilst the Germans have also the neuter. Now, as things may be masculine, feminine, or neuter, the common-sense appears with the Germans; consequently a student has to learn, when studying French, what the French people have chosen to call masculine, and what feminine, and in this there is no reason to guide him. It is true a man is called masculine and a woman feminine; but why the sun should be called masculine and the moon feminine is explicable on no reason whatever; and so we may proceed, finding the most arbitrary rules for this selection, a breach of any one of which causes the breaker to become a subject for ridicule. But, again, if this selection of the sexes of words were universal, there might be some hopes for a student of many languages, but what the French class as feminine the Germans often put down as neuter, and the Italians as masculine; thus, the sun in German is feminine and the moon masculine, for what reason it is impossible to say; and thus confusion reigns supreme in this subject, to the total exclusion of reason. Our own case will, we believe, be found similar to that of hundreds of thousands of other people. As a boy, we were taught Greek and Latin, such an amount as enabled us to read a Greek Testament with the use occasionally of a lexicon, and to read freely Ovid and Virgil. But our future career was selected to be one in which Greek and Latin were not subjects for examination; but French and German "paid well;" consequently, four years were devoted to the study of these two languages, at the end of which time we find ourselves in South Africa, where the only languages of any practical use were Dutch and Caffre. To Dutch and Caffre, consequently, we turned our attention, and after rather more than a year's study, we were able to converse imperfectly in both these. But again were we on the point of finding these later labors useless, for there was every prospect of our services being transferred to India, and we heard from good authority

that we were not likely to get on there unless we could speak Hindustani, and perhaps understood Sanscrit or Persian.

Here, then, were Greek, Latin, French, German, Dutch, Caffre, Hindustani, Persian, Sanscrit, all to be learned in order that one's own thoughts and wishes should be made intelligible to another person. In our judgment, this is not only a mistake, but it is a mistake which is remediable, and which is a slur upon the common sense and civilization of the world.

In music there is but one language. The composition of a German composer can be at once read and translated into sounds by the musicians of the whole world. To an English musician it is a matter of indifference what is the nationality of the composer; there is in music but one language, and that one simple and intelligible; and yet, what is the importance of making musical sounds, compared to the importance of conveying our thoughts to other people, and making them intelligible; yet there are a thousand different ways of doing the latter instead of one, and unless a person know at least four or five of these—that is, unless he employ some four or five years of his life in acquiring a knowledge of these languages—he is dumb in many countries.

Unfortunately, also, unless a person keep perpetually practicing a language, he soon forgets it, and all his past labor, or at least a great part of it, has to be gone over again.

When a missionary commences his labors in any savage country, he at once endeavors to learn the language of the people among whom his time is passed; he then usually proceeds to teach the natives his own language. Thus, we have found Caffres who spoke Dutch, German, French, and English, each language having been taught them by the missionaries in their neighborhood. Of course, an Englishman was unintelligible to the Caffre who spoke French, Dutch, or German, and so had to resort to signs.

The remedy for this confusion is one quite within the power of modern civilization. We consider the prospects of a remote future generation as regards their coal, which we are now using extravagantly, so we ought not to be termed Utopian if we propose a method by which our successors will have but little trouble in learning languages. A committee of the scientific men of all nations should be formed, which should decide on a language that shall be termed the universal language. This language may be one at present in existence, or one based upon an existing language.

Let us suppose that German is found to be the most expressive and complete of existing languages, and one decided on as the universal tongue. We commence our education not with a superficial knowledge

of several languages, but with a thorough knowledge of German only. All other nations adopt the same course; and we know that wherever civilization has spread, wherever missionaries have resided and taught, we who speak this universal language will be at once intelligible, and able to communicate our thoughts readily.

Having but one language to learn and keep up, we should soon think in this language, and should thus be able to express ourselves equally as well as in our native tongue.

People also would feel that they could not get on out of their own country unless they spoke this universal language, and thus so practical and essential an advantage would be gained by acquiring a knowledge of it that it would be to each person's interest to study it. At the present time many of us feel indisposed to occupy several years in learning several languages, because we know that our residence in the countries in which these languages are spoken is likely to be of short duration; thus the return for our labors would not be adequate, and we naturally decline to waste our time on such subjects. If, however, we knew that one language would carry us all over the world—that whilst we in our youth were studying the universal language, there were also Russians, Turks, Egyptians, French, Dutch, Spanish, Portuguese, Hindus, Persians, Caffres, Italians, Norwegians, Swedes, and Greeks employed in the same manner—and thus that we could readily communicate with a native of each of those countries by simply learning one language, so great a practical advantage would evidently be gained that every man would have his heart in his work.

We are convinced that much of the coldness shown by young people in learning languages is due to the fact that they consider a knowledge of a certain tongue is not likely to be of practical use to them, and their conclusion is usually correct. Not long since we heard a youngster exclaim that he was being crammed with Greek and Latin, and a smattering of French and German. "Of what use will Greek and Latin ever be to me," he said, "or French or German, when the army is to be my profession, and probably I shall be in India all my life."

It is a question whether this is not a subject of sufficient national importance in all countries to be taken up officially, or at least encouraged by each government. In our improved national schools, in our colleges, and in private instruction, it should be understood that henceforth some particular language is to be the universal means of communication between men of all nations. Then, in a very few years, the English boy of twelve years old would find himself able, by means of the universal language, to chat or play with boys of Russia or Germany, France or Spain, Italy or Greece, and this with scarcely so much labor

and waste of time as he now expends on a very superficial smattering of Greek and Latin, French and German, all which mere superficial acquirement fades away rapidly from the memory, and leaves but little useful deposit.

The grown-up man who spoke the universal language would, for business purposes, or for pleasure, find himself as much at home among the men of business or science, of every foreign country, as he would at his own society; and thus more satisfactory results would be obtained by one year's labor in acquiring one language than are now obtained in many years spent in learning several. Organization and unity are alone required, and these, we believe, are even now obtainable.

THE PERSISTENCE OF CERTAIN CUSTOMS IN RUDIMENTARY FORMS.

RUDIMENTARY organs in animals and plants are such as never become sufficiently developed to perform their normal functions. Thus, legs are evidently to walk with; but certain snakes have abortive traces of them under their skins. Wings are to fly with; but the apteryx has them in the form of useless stumps, and in many species of insects they are so reduced in size as to be utterly incapable of flight, and sometimes lie under wing-cases firmly soldered together. Teeth are to chew with; but foetal whales, animals which do not chew, have teeth which never cut through the gum. Mr. Darwin's explanation of such anomalies is that ages ago the animals from which these are descended possessed the organs in a perfect state, and that under changed habits of life they have become reduced, either by simple disuse or by the more frequent survival of the individuals which were least encumbered with a superfluous part.

In precisely the same manner the customs of primitive nations have been modified and reduced to a rudimentary state. The main stream of every man's life is determined by the circumstances into which he is born. We all walk in the footsteps of our fathers, even in the most civilized countries, where discussion spares not the fundamental institutions of society. But each man has his own peculiar ways, too, by the imitation of which new habits are acquired by his successors. And often these new habits are not consonant with the old ones, and press hard to thrust them out. Changed circumstances, too, often favor changed modes of life; and the result is that innumerable customs are

continually rising and falling wave-like on the stream of time, leaving now and then, however, slight traces of their former prevalence. It is our intention here to take note of a few instances in which remnants of old customs have survived in this way. The reader will find the subject more fully pursued by Mr. E. B. Tylor, whose works well deserve study for their wide research and careful criticism.

To begin with the subject of dress as a familiar one, books of costume furnish numberless illustrations of parts of garments only worn for fashion's sake, but which have been retained with more or less alteration from what was once really useful. The absurd little tails of a German postillion's coat show of themselves from what they have dwindled. But the English clergyman's bands do not indicate that they have shrunk to their present state from the wide serviceable collars worn by scholars generally in the seventeenth century. The claret-colored coat, lace shirt-frills, ruffles, knee-breeches, white silk stockings, and buckled shoes, which once formed the usual attire of an English gentleman, still survive as the court-dress. And wigs, such as were worn by all gentlemen a century and a half ago, now adorn the heads of judges and barristers only. Courts of royalty and courts of law are highly conservative institutions, and regulate their ways much by precedent.

A survival of a much more ancient custom is tattooing, which flourishes in full vigor among savages, but in civilized life retains only a feeble vitality among the ruder classes. Modern women, however, cling with remarkable tenacity to the old custom of mutilating their ears to hang jewels in them. Among savages this form of decoration undoubtedly originated, and among savages it now exists in unpruned luxuriance. They load their ears with weights that pull them in long pendants to the shoulders; they thrust rings, bones, and feathers through the cartilage of their noses; they insert ivory studs in the corners of their mouths; they hang long wooden figures to slits in their under lips; and they stick pointed teeth of various animals through holes in their cheeks.

Forms of courtesy present the same characteristics as dress and personal adornment. They were at first signs of submission and reverence to rulers. *Herr, Don, Senor, Signor, Sieur, Sir*, were all formerly titles of feudal lords. By gradual application to persons lower and lower in the social scale, in order to compliment or propitiate them, they have come to be the common forms of address of their respective countries. *Dame*, once a term of great dignity, to which in old books we usually find "highborn" and "stately" prefixed as appropriate adjectives, has now sunk to an epithet almost of contempt. And if we trace the com-

pound *Ma Dame* through its contractions, *madam, ma'am, mam*, down to the terminal *m* in *Yes'm*, we find that this phrase of vulgarest use was once about equivalent to "Yes, your highness." So, too, our meaningless subscriptions to formal letters, "yours faithfully," "yours truly," "your most obedient servant," were originally the expressions of a slave to his master. The Orientals retain in courtesy the terms of their more absolute despotisms, addressing ordinary persons in such phrases as "I am your slave," "I am your sacrifice," "All that I have is yours."

As to inclinations of the body, they probably originated in abject submission to a conqueror or in worship of a divine ruler. It was the practice of the ancient kings of the East to trample upon the conquered; and there are existing savages, among whom submission is signified by placing the neck under the foot of the person submitted to. Voluntary prostration was an attempt to mitigate wrath by saying in signs, "Tread on me if you will." It was once a general mode of submission to the great, but has become modified into the slightest possible symbol, the bow and the nod. The same may be said of the courtesy, an abridged act of kneeling, primarily a reverence due to a monarch. Uncovering the head, too, was an act of submission or reverence to kings or gods, but is now accorded to very ordinary persons. Mr. Herbert Spencer has worked up this subject in an essay on *Manners and Fashion*, which is copious in illustrations.

The games of children have in many cases preserved customs that had died out among their elders. A large part of the amusement of children is to imitate what they see to be the serious business of those around them. Girls act the part of mother to their dolls, give tea parties, make play visits, &c.; boys play at soldiering, riding, building, &c.; both boys and girls are fond of teaching a mimic school and vigorously flogging their pupils. The Esquimaux children build little snow huts; the Australian children make for themselves miniature boomerangs. Boys' games have very generally originated in the imitation of battles, prisoner's base, for example. The bow, with the arrow, was once one of the most important weapons of war and the chase; with some savages it still remains so. It held its ground through barbaric and classic civilization, and till late in the middle ages: but it has become with us merely a toy for children. The sling is a similar case. For antiquity and diffusion in the world it ranks with the bow and arrow; but it now does service only to boys at play. Mr. Tylor mentions that some curious masquerading games now played in Europe are survivals of ancient sacrifices and sacred feasts, and traces the origin of many games of chance to the formerly wide-spread custom of divination by lot. The process of descent may be well seen in what Mr. W. Mariner tells us of the Polynesians.

sian method of divination by spinning the niu, or cocoa-nut. In the Tonga islands this was solemnly performed in cases of sickness, prayer being first made to the patron god of the family to direct the nut: its position when it came to rest showed the will of the god. On other occasions it was merely spun for amusement. Here the serious and the sportive uses of the niu are found together. In the Samoan islands it was formerly spun as an art of divination to discover thieves, but is now only kept up as a sort of gambling—a party-sitting in a circle, the nut spun in the middle, and the person to whom its monkey-face is turned when it stops, paying a forfeit. It is in favor of the view of serious divination being the earlier use that the New Zealanders, though they have no cocoa-nuts, keep up a trace of the time when their ancestors in the tropical islands had them and divined with them, by the use of the well-known Polynesian word niu for various kinds of divination. The Chinese, like the Tongans, take omens by solemn appeal to the lots kept in the temples, and also gamble by lots for cash and sweetmeats. The invocation of gods or saints for success in gaming, a well-established habit in some barbarous and in some superstitious countries, is perhaps a remnant of the original notion of supernatural interference in appeals to lot.

But games of chance are only one species of the innumerable throng of superstitious customs that have survived in a more or less modified form. The ancient worship of Mother Earth among the Indo-European races survived till the beginning of the present century in the Christmas food-offerings buried for the earth in Germany. To the gipsies even now the earth is so holy that they take care not to let their drinking-cups touch the ground, as they would thus become too sacred to be used by men. Fire-worship, too, has still its remnants. The Esthonian bride consecrates her new home by an offering cast into the fire for Tule-ema, Fire-mother. The Carinthian peasant throws lard or dripping into the fire as an offering, that it may not burn his house. The Bohemian will not spit into the fire, "God's fire," as he calls it. He deems it wrong to throw away the crumbs after a meal, for they belong to the fire; and holds it right to give the fire a part of every dish cooked. The supreme deity of fire-worshippers—the sun—has been, according to Sir William Jones, "the fountain of all idolatry in the four quarters of the globe." To this day, in the upper Palatinate, the peasant takes off his hat to the rising sun. And in Pomerania the fever-stricken patient prays to the sun at sun-rise, "Dear Sun, come soon down, and take the seventy-seven fevers from me, in the name of God the Father." A trace of solar worship survives throughout a large part of christendom in the custom of turning in prayer towards the east, retained in both the Greek and the

Latin ritual. The great sun-festivals have also been incorporated into christianity. Christmas day was adopted as the birthday of Christ in the fourth century, having previously been a Pagan festival called by the Romans "the Birthday of the Unconquered Sun." It arose from the fact that the lengthening of the days is then clearly observable. The spring festivals held in rejoicing at the increasing power of the sun and the beginning of another season of vegetation have retained some of their characteristics. Easter bonfires are still kindled on the North German hills; and in Saxony and Brandenburg the peasants climb the hill-tops before dawn on Easter morning to see the rising sun give his three leaps of joy. The festival held in Catholic countries on Midsummer day in honor of John the Baptist is a remnant of the fire-festivals held by Pagans at the summer solstice. The great bonfires on the heights, round which men danced and through which they leaped, and the blazing wheels rolled from the hills into the valleys in sign of the sun's descending course, have dwindled to comparatively feeble bonfires and lighted tapers carried in procession.

The origin of the belief in apparitions has been a good deal studied of late. The phenomena of sleep, trances, dreams, and other illusions, combining with many unexplained appearances and noises, have contributed to form in the minds of the lower races a conception of a shadowy, film-like human image united with the body of man, but leaving it at death, and possessed of mysterious powers. This "spirit" is dressed in the well-known clothing worn in life, a natural corollary of which is that clothing and other inanimate objects have also spirits. And the savage does not stagger at this: many tribes carry it to the fullest extent. "The Fiji people," says Mr. Mariner in his account of the Tonga islands, "can show you a sort of natural well, or deep hole in the ground, at one of their islands, across the bottom of which runs a stream of water, in which you may clearly perceive the souls of men and women, beasts and plants, of stocks and stones, canoes and houses, and of all the broken utensils of this frail world, swimming, or rather tumbling along one over the other pell-mell into the regions of immortality."

Now it easily flows from this belief that the hovering spirit may after his death desire to make use of the possessions which he prized in life. Hence, his clothes and weapons, together with some food and perhaps tobacco, are also made ghosts of by being buried or burned with the body. This custom, however, involves too much self-deprivation on the part of the living to be carried out with logical consistency. Hence it strongly tends to become rudimentary. Especially is this the case with respect to food: the savage finds it hard enough to provide for his living

family, and cannot spare much for the dead. The food-offerings are consequently trifling wherever the custom lingers. But the other offerings are almost equally so. The Kanowits of Borneo talk much of setting a dead man's property adrift for use in the next world, and even go so far as to lay out his valuables by the bier; but in fact they only commit to the frail canoe a few worthless trifles. The Winnebago Indians used to bury a pipe and tobacco, and sometimes a club, at a warrior's grave; but his valuable goods, though hung up as a nominal sacrifice at the burial-place, were gambled for after the interment. The Chinese have reduced to a singular system the art of replacing costly offerings by inexpensive imitations. Clothing, food, furniture, domestic animals, &c., are represented by paper figures. Especially is there a demand for pasteboard money covered with tinfoil colored yellow in imitation of gold. The sham here becomes a serious reality, thousands of women and children in a Chinese city being employed in manufacturing it. It is a fine thing to send a trunkful of gold to our friends who have gone to the spirit land. There are pretty paper houses, too, furnished with all the modern Chinese conveniences; and paper keys to unlock the paper chests that hold the paper ingots—all burnt to ashes, to rise phoenix-like as spiritual bodies of enormous value.

But sacrifices for the dead have horrible features, as well as ludicrous ones. It was a common tenet of early philosophy that when a man of rank dies, his attendants, slaves, and wives are as necessary to him in the next world as in this. Hence the custom prevailed of putting them to death at his funeral, that they might continue their services in the future life. This custom was widely extended throughout Asia, Africa, America, and Oceanica, until very recent times; and it is not yet extinct in many savage tribes. Among the Borneans slaves were formerly killed at the funeral of a great man, having been previously enjoined to take great care of their spiritual master, to shampoo him when indisposed, to be always near him, and to obey all his commands. In the Fiji islands the wives of a deceased person were strangled at his funeral, and their corpses, oiled as for a feast, clothed with new fringed girdles, with heads dressed and ornamented, and vermilion and turmeric powder spread on their faces and bosoms, were laid by the side of their former lord. Associates and inferior attendants were also slain. "When Ra Mbithi, the pride of Somosomo, was lost at sea, seventeen of his wives were killed; and after the news of the massacre of the Namena people, in 1839, eighty women were strangled to accompany the spirits of their murdered husbands." Warriors, slaves, and wives were slain to continue their duteous offices to monarchs and other nobles, in the somewhat civilized States found by the Spaniards in Central America, Mexico,

Bogota, and Peru. The Qualkeoths of the North-west, however, did not actually sacrifice the widow, but made her rest her head on her husband's corpse while it was being burned, until at last they dragged her almost dead from the flames. But human life is held cheap among savages; and the sacrifice of this one thing is not grudged like that of property in general. All through savage Africa these horrid funeral rites prevail, a common mode of sacrifice being burial alive with the corpse. The king of Dahomy must enter the other world with a ghostly court comprising hundreds of wives, eunuchs, singers, drummers, and soldiers. And further, Captain Burton tells us that they annually slaughter a number of fresh attendants as an act of piety to their departed monarchs. Moreover, whatever action, however trivial, is performed by the king, must be dutifully reported to his sire in the shadowy realm. "A victim, almost always a war-captive, is chosen; the message is delivered to him, an intoxicating draught of rum follows it, and he is dispatched to Hades in the best of humors." In some of the southern districts of Africa the custom is also retained; in others it has fallen into disuse, though old men still remember the times when servants and attendant warriors were cast into the fire which consumed a chief, that they might prepare things beforehand and get food for him.

The transformation of such customs to rudimentary forms is, however, most clearly seen in Asia, among whose teeming populations they were once carried to frightful lengths, hundreds of attendants following noblemen and monarchs to the land of shades. In the seventeenth century, we are told, on the death of a Japanese nobleman, from ten to thirty of his servants gave themselves to their lord by committing *hari kari*. In our own day they place by the corpse images of clay, wood, and stone, as a substitute for real men. Among the Ossetes, a tribe of Caucasus, the widow and saddle-horse of a dead man are led thrice round the grave, and no man may afterwards marry the widow or ride the horse. In China the memory of the ancient funeral sacrifice is preserved in legend; and even now the suicide of widows to accompany their husbands is a recognized practice, sometimes even performed in public. In general, sedan-carriers and an umbrella-bearer are provided for the dead, and horsemen are sent beforehand to announce his arrival—all these servants and messengers being made of paper.

In early ages the Indo-European race is known to have practiced human sacrifices of the same kind. We read in Homer of Trojan captives laid with horses and hounds on the funeral pile of Patroclus, and of Evadne throwing herself into the fire that consumed the remains of her husband. The Scandinavian myths tell of Brunhild on the pile by her beloved Sigurd, and of men and maids following them on the way

to Hela. With Balder, also, his dwarf foot-page, his horse, and his saddle are burnt. Cæsar informs us that the Gauls in his time burnt at the funeral of a man of importance whatever was dear to him, including animals, much-loved slaves, dependents, and sometimes wives. The same customs are attributed to the old Slavonic peoples. St. Boniface says of the Wends: "She is held praiseworthy among women who slays herself with her own hand, that she may be burnt on one pyre with her lord." And in India it is well known that the *suttée* was only suppressed by the British government during the present century. It is a curious feature of this case that far back in Vedic times this custom had either decayed or was being reformed; for the ancient Brahmanic funeral rites, as laid down in the Veda, provide for sparing the widow. They direct that she is to be set upon the funeral pile with her husband's corpse; but that a brother-in-law, or an adopted child, or an old servant is to lead her down again. Other possessions of the deceased are, however, to be burnt up with him. This indicates that a humane law had substituted a mere pretence for a real sacrifice, and that modern Hindoo burning was a revival of a barbarous custom that had been more or less outgrown in the days when the sacred books were written. Indeed, the old Brahmanic law expressly forbids widow-burning to that caste. But so sadly had they degenerated that when the British government prohibited it the Brahmans resisted to the utmost, and actually falsified the sacred Veda in favor of their highly-prized rite of *suttée*.

Space would fail us here to enumerate a tithe of the striking examples which might be adduced of unreasoning persistence in old customs. Books of travel are full of them; our own daily life is full of them. Ardent reformers are apt, in estimating the effects of measures, unconsciously to take for granted that they will be worked by the light of pure reason. But, in reality, the success of an innovation depends largely on the degree in which it will harmonize with the settled customs, the rooted convictions, of all those whom it affects. And, to accomplish any important end, the best method—other things being equal—is that which requires least change in the state of things already established.

PUBLIC EXPENDITURES—THEIR INCREASE AND DIMINUTION.

[SPEECH OF HON. JAMES A. GARFIELD, OF OHIO, IN THE HOUSE OF REPRESENTATIVES,
JANUARY 23, 1872.]

"A nation embodies its spirit, and much of its history in its financial laws. Let one of our [British] budgets alone survive the next deluge, and in it will plainly appear all that we are."—*Dupont White.*

THE house having resolved itself into the committee of the whole, proceeded to the consideration of the house bill No. 1080, making appropriations for the legislative, executive, and judicial expenses of the government for the year ending June 30, 1873, and for other purposes, Mr. Garfield said:—

MR. CHAIRMAN—In opening the discussion of this bill I realize the difficulties which at all times attend the work of making appropriations for carrying on this government. But there are more than ordinary difficulties attending the work of a chairman who succeeds to a position which has been so adorned as has the chairmanship of the committee on appropriations during the past two years. The most I can now venture is to express the hope that by the generous aid of my colleagues on the committee and the support of the house I may be able to follow, at an humble distance, in the path my predecessor has travelled.

I would not occupy any time this morning in the preliminary discussion of this bill but for the fact that this general appropriation bill, more than any other of the eleven which will come before the house, embraces in its scope nearly the whole civil establishment of the government. The approval of this bill is, in a certain sense, the approval of the whole system to which the other appropriations will refer. If our general plan of appropriations ought to be attacked, this is the place to begin. If they have a sufficient reason for being in the main what they are, that sufficient reason can be given for the passage of this bill substantially as it stands in the print before us. I therefore beg the indulgence of the committee while I call attention to a few questions which have arisen in my mind during the study I have given this subject.

RELATION OF EXPENDITURES TO THE GOVERNMENT.

And first of all I will consider what part expenditures play in the affairs of the government. It is difficult to discuss expenditures comprehensively without discussing also the revenues; but I shall on this occasion allude to the revenues only on a single point. Revenue and the expenditure of revenue form by far the most important element in the government of modern nations. Revenue is not, as some one has said, the friction of a government, but rather its motive power. Without it the machinery of a government cannot move; and by it all the movements of a government are regulated. The expenditure of revenue forms the grand level from which all heights and depths of legislative action are measured. The increase and the diminution of the burdens of taxation depend alike upon their relation to this level of expenditures. That level once given, all other policies must conform to it and be determined by it. The expenditure of revenue and its distribution, therefore, form the best test of the health, the wisdom, and the virtue of a government. Is a government corrupt, that corruption will inevitably, sooner or later,

show itself at the door of the treasury in demands for money. There is scarcely a conceivable form of corruption or public wrong that does not at last present itself at the cashier's desk and demand money. The legislature, therefore, that stands at the cashier's desk and watches with its argus eyes the demands for payments over the counter is most certain to see all the forms of public rascality. At that place, too, we may feel the nation's pulse; we may determine whether it is in the delirium of fever, or whether the currents of its life are flowing with the steady throbbings of health. What could have torn down the gaudy fabric of the late government of France so effectually as the simple expedient of compiling and publishing a balance-sheet of the expenditures of Napoleon's government, as compared with the expenditures of the fifteen years which preceded its reign? A quiet student of finance exhibited the fact that during fifteen years of Napoleon's reign the expenditures of his government had been increased by the enormous total of \$350,000,000 in gold per annum. Much of this vast sum had been covered up under various forms of statement; but the merciless arithmetician stripped off the disguise and showed the yawning, bottomless gulf into which France was rushing to certain and inevitable ruin. Ere long she took the fatal plunge. She had kept on a fair exterior; but all the while the solid foundations of her strength were being honeycombed through and through by extravagance and corruption in her finances, and at last she went down in the smoke and desolation of war. It was only the crashing through of the worthless fabric that was ready to perish when the occasion should come. We have seen in some of our own municipal governments, and perhaps in some of our State governments, the same process going on, which, if not arrested, must ultimately bring them to a fate hardly less deplorable.

HOW SHALL EXPENDITURES BE GAUGED?

Such, in my view, are the relations which the expenditures of the revenue system sustain to the honor and safety of the nation. How, then, shall they be regulated? By what gauge shall we determine the amount of revenue that ought to be expended by the nation? This question is full of difficulty, and I can hope to do little more than to offer a few suggestions in the direction of its solution.

And first I remark that the mere amount of the appropriations is in itself no test. To say that this government is expending \$392,000,000 a year may be to say that we are penurious and niggardly in our expenditures, or may be to say that we are lavish and prodigal. There must be some ground of relative judgment, some test by which we can determine whether expenditures are reasonable or exorbitant. It has occurred to me that two tests can be applied.

TEST OF POPULATION.

The first and most important is the relation of expenditure to the population. In some ratio corresponding to the increase of population it may be reasonable to increase the expenditures of a government. This is the test usually applied in Europe. In an official table I have before me of the expenditures of the British government for the last fifteen years, I find the statement made over against the annual average of each year of expenditure per capita of the population. The average expenditure per capita for that period was £2 7s. 7d., or about \$12 in gold, with a slight tendency to decrease each year. In our own country, commencing with 1830 and taking the years when the census was taken, I find that the expenditures per capita, exclusive of payments on the principal and interest of the public debt, were as follows:—

In 1830.....	\$1 03	In 1860.....	\$1 94
In 1840.....	1 41	In 1870.....	4 26
In 1850.....	1 60		

or, excluding pensions, \$3.52. No doubt this test is valuable. But how shall it be applied? Shall the increase of expenditures keep pace with the increase of population? We know that population tends to increase in a geometrical ratio; that is, at a per cent.

compounded annually. If the normal increase of expenditures follows the same law, we might look forward to the future with alarm. It is manifest, however, that the necessity of expenditures does not keep pace with the mere increase of numbers; and while the total sum of money expended must necessarily be greater from year to year, the amount per capita ought in all well-regulated governments, in time of peace, to grow gradually less.

TEST OF TERRITORIAL SETTLEMENT AND EXPANSION.

But in a country like ours there is another element besides population that helps to determine the movement of expenditures. That element can hardly be found in any other country. It is the increase and settlement of our territory, the organic increase of the nation by the addition of new States. To begin with the original thirteen States and gauge expenditure till now by the increase of population alone, would be manifestly incorrect. But the fact that there have been added twenty-four States, and that we now have nine territories, not including Alaska, brings a new and important element into the calculation. It is impossible to estimate the effect of this element upon expenditures. But if we examine our own records from the beginning of the government, it will appear that every great increase of settled territory has very considerably added to the expenditures.

If these reflections be just, it will follow that the ordinary movement of our expenditures depends upon the action of two forces: first, the natural growth of population, and second, the extension of our territory and the increase in the number of our States. Some day, no doubt, (and I hope at no distant day,) we shall have reached the limit of territorial expansion. I hope we have reached it now, except to enlarge the number of the States within our borders; and when we have settled our unoccupied lands, when we have laid down the fixed and certain boundaries of our country, then the movement of our expenditure in time of peace will be remitted to the operation of the one law—the increase of population. That law, as I have already intimated, is not an increase by a per cent. compounded annually, but by a per cent. that decreases annually. No doubt the expenditures will always increase from year to year, but they ought not to increase by the same per cent. from year to year; the rate of increase ought gradually to grow less.

EXPENDITURES OF ENGLAND.

In England, for example, where the territory is fixed, and they are remitted to the single law of increase of population, the increase of expenditure during the last fifteen years of peace has been only about one and three-quarter per cent. compounded annually. I believe nobody has made a very careful estimate of the rate in our country; our growth has been too irregular to afford data for an accurate estimate. But a gentleman who has given much attention to the subject expressed to me the belief that our expenditures in time of peace have increased about eight per cent. compounded annually. I can hardly believe it; yet I am sure that somewhere between that and the English rate will be found our rate of increase in times of peace. I am aware that such estimates as these are unsatisfactory, and that nothing short of the actual test of experience can determine the movements of our expenditures; but these suggestions, which have resulted from some study of the subject, I offer for the reflections of those who care to follow them out.

EFFECTS OF WAR ON EXPENDITURES.

Thus far I have considered the expenditures that arise in times of peace. Any view of this subject would be incomplete that did not include a consideration of the effect of war upon national expenditures. I have spoken of what the rate ought to be in time of peace for carrying on a government. I will next consider the effect of war on the rate of increase. And here we are confronted with that anarchic element, the plague of nations, which Jeremy Bentham called "mischief on the largest scale." After the fire and blood of the battle-fields have disappeared, nowhere does war show its destroying power so

certainly and so relentlessly as in the columns which represent the taxes and expenditures of the nation. Let me illustrate this by two examples.

In 1792, the year preceding the commencement of the great war against Napoleon, the expenditures of Great Britain were less than £30,000,000 sterling. During the twenty-four years that elapsed from the commencement of that wonderful struggle until its close at Waterloo in 1815, the expenditures rose by successive bounds until, in one year near the close of the war, it reached the enormous sum of £106,750,000.

The unusual increase of the public debt, added to the natural growth of expenditures from causes already discussed, made it impossible for England ever to reach her old level of expenditure. It took twenty years after Waterloo to reduce expenditures from £77,750,000, the annual average of the second decade of the century, to £45,750,000, the expenditure for 1835. This last figure was the lowest England has known during the present century. Then followed nearly forty years of peace, from Waterloo to the Crimean war in 1854. The figures for that period may be taken to represent the natural growth of expenditures in England. During that period the expenditures increased, in a tolerably uniform ratio, from £45,750,000, the amount for 1835, to about £51,750,000, the average for the five years ending 1853-54. This increase was about four million dollars of our money per annum. Then came the Crimean war of 1854-1856, during one year of which the expenditures rose to £84,500,000.

Again, as after the Napoleonic war, it required several years for the expenditures of the kingdom to get down to the new level of peace, which level was much higher than that of the former peace. During the last ten years the expenditures of Great Britain have again been gradually increasing; the average for the six years ending with March 31, 1871, being £68,750,000.

WAR EXPENDITURES OF THE UNITED STATES.

As the second example of the effect of war on the movement of national expenditures, I call attention to our own history. Considering the ordinary expenses of the government, exclusive of payments on the principal and interest of the public debt, the annual average may be stated thus:—

Beginning with 1791, the last decade of the eighteenth century showed an annual average of \$3,750,000. During the first decade of the present century, the average was nearly \$5,500,000. Or, commencing with 1791, there followed twenty years of peace, during which the annual average of ordinary expenditures was more than doubled. Then followed four years, from 1812 to 1815, inclusive, in which the war with England swelled the average to \$35,500,000. During the five years succeeding that war, the average was \$16,500,000; and it was not until 1821 that the new level of peace was reached. During the five years, from 1820 to 1825, inclusive, the annual average was \$11,500,000. From 1825 to 1830 it was \$18,000,000. From 1830 to 1835 it was \$17,000,000. From 1835 to 1840, in which period occurred the Seminole war, it was \$30,500,000. From 1840 to 1845 it was \$27,000,000. From 1845 to 1850, during which period occurred the Mexican war, it was \$40,500,000. From 1850 to 1855 it was \$47,500,000. From 1855 to June 30, 1861, it was \$67,000,000. From June 30, 1861, to June 30, 1866, \$718,750,000; and from June 30, 1866, to June 30, 1871, the annual average was \$189,000,000.

It is interesting to inquire how far we may reasonably expect to go in the descending scale before we reach the new level of peace. We have already seen that it took England twenty years after Waterloo before she reached such a level. Our own experience has been peculiar in this, that our people have been impatient of debt, and have always determinedly set about the work of reducing it.

DURATION OF WAR EXPENDITURES.

Throughout our history there may be seen a curious uniformity in the movement of the annual expenditures for the years immediately following a war. We have not the data to

determine how long it was, after the war of independence, before the expenditures ceased to decrease, that is, before they reached the point where their natural growth more than balanced the tendency to reduction of war expenditure; but in the years immediately following all our subsequent wars, the decrease has continued for a period almost exactly twice the length of the war itself. After the war of 1812-15, the expenditures continued to decline for eight years, reaching the lowest point in 1823. After the Seminole war, which ran through three years, 1836, 1837, and 1838, the new level was not reached until 1844, six years after its close. After the Mexican war, which lasted two years, it took four years, until 1852, to reach the new level of peace.

WHEN SHALL WE REACH OUR NEW LEVEL OF EXPENDITURES?

It is perhaps unsafe to base our calculations for the future on these analogies; but the wars already referred to have been of such varied character, and their financial effects have been so uniform, as to make it not unreasonable to expect that a similar result will follow our late war. If so, the decrease of our ordinary expenditures, exclusive of the principal and interest of the public debt, will continue until 1875 or 1876. It will be seen by an analysis of our current expenditures that, exclusive of charges on the public debt, nearly \$50,000,000 are expenditures directly for the late war. Many of these expenditures will not again appear, such as the bounty and back pay of volunteer soldiers, and payment of illegal captures of British vessels and cargoes. We may reasonably expect that the expenditures for pensions will hereafter steadily decrease, unless our legislation should be unwarrantably extravagant. We may also expect a large decrease in expenditures for the internal revenue department. Possibly we may ultimately be able to abolish the department altogether. In the accounting and disbursing bureaux of the treasury department we may also expect a further reduction of the force now employed in settling war claims.

We cannot expect so rapid a reduction of the public debt and its burden of interest as we have witnessed for the last three years; but the reduction will doubtless continue, and burden of interest will constantly decrease. I know it is not safe to attempt to forecast the future; but I venture to express the belief that if peace continues, the year 1876 will witness our ordinary expenditures reduced to \$125,000,000, and the interest on our public debt to \$95,000,000, making our total expenditures, exclusive of payment on the principal of the public debt, \$220,000,000. Judging from our own experience and from that of other nations, we may not hope thereafter to reach a lower figure. In making this estimate I have assumed that there will be a considerable reduction of the burdens of taxation, and a revenue not nearly in so great excess of the expenditures as we now collect.

PUBLIC DEBT OF THE UNITED STATES.

The movement of our public debt may be thus summarily stated: Commencing with January 1, 1789, we had a debt of \$75,000,000. It took twenty-one years to reduce its bulk to \$45,000,000, the amount outstanding in 1812. The war with England raised it to \$127,000,000, where it stood in 1816. It took twenty years more to pay it off. The war with Mexico left us with a debt of \$68,000,000, and it took ten years to reduce it to \$38,500,000, the lowest point it has ever reached since 1846. The debt of our late war reached its stupendous maximum July 31, 1865. In the six and a half years that have since elapsed it has been reduced by the sum of \$556,579,578, a reduction of 20½ per cent. of its whole amount. During that time the amount of the annual interest on the debt has been reduced by the sum of \$42,500,000.

I subjoin a table prepared at the treasury department, which exhibits, in successive years, the movement of the principal and interest of the public debt since its maximum was reached.

Statement of reduction of public debt, interest charges, and treasury balances.

Date.	Amount of principal of public debt.	Balance in Treasury.		Total treasury balance.	Debt less cash.	Yearly interest charged.
		Gold.	Currency.			
July 31, 1865, (maximum)	\$2,872,734,908	\$35,387,858	\$81,401,775	\$116,789,633	\$2,755,945,275	\$151,832,051
March 1, 1869.....	2,606,994,694	98,741,261	16,838,529	115,584,790	2,491,399,904	126,389,550
March 1, 1871.....	2,407,174,246	103,174,209	20,854,806	124,028,815	2,283,145,431	114,862,039
July 1, 1871.....	2,333,211,332	96,683,900	9,533,333	106,217,233	2,246,994,099	111,439,385
July 1, 1872.....	* 2,326,710,016	111,432,826	15,861,493	† 127,294,319	2,199,415,697	109,223,622
					\$556,579,578	\$42,608,329

* Reduction since July 31, 1865, \$546,024,892.

† Increase over July 31, 1865, \$10,554,683.

This rapid reduction of the principal and interest of our public debt tends also to strengthen the hope that for three or four years to come our expenditures may continue to decrease. It would be cheering, indeed, if we might also hope that when the nation again begins the ascent, it will be up the beautiful slope where no sign of war shall come for many long years. If so, the ascent will be gradual and gentle, and will mark the course of the highway along which the nation shall move upward and forever upward in its grand career of prosperity. But let it be forever borne in mind that the day which witnesses a new war increases more and more heavily than ever the calamities of the past: for the burdens of the past are mainly the burdens of war, and there is a point to which a national debt may raise when its people lose heart and grow hopeless under the burden.

NECESSITY OF REDUCING OUR PUBLIC DEBT.

Conceding to England all her wealth, all her greatness, and all her glory, still one fact in her history is so full of gloomy portent that I have never been able to understand how her statesmen could look upon it without the profoundest alarm. It would seem that all hope of paying off, or even of considerably reducing her public debt, is extinguished in the minds of her people. The last attempt in that direction was made by the chancellor of the exchequer, Mr. Gladstone, in his speech on the budget of 1866. After affirming that nine leading nations of Europe had incurred a debt of no less than £1,500,000,000 sterling during the last twenty-five years, and that, too, in a time of very general peace, he said that America was the only great nation of the world that was now considerably reducing her debt. Then referring to the British debt, he said:—

“At the close of the war against France in 1815, the British debt was £902,264,000. On the 5th January, 1854, it was £800,515,000. From 1815 to 1854 there were nearly forty years of the most profound tranquillity ever known in this country.” * * * * *

“The rate of decrease during that period was £2,609,000 per annum.” * * *

“I do not believe, if we take the whole years of peace since 1815, that the average reduction would reach £3,000,000. If ever we should become involved in any great and protracted war, we must expect to see the debt increase at about ten times the annual rate by which we reduce it in time of peace.”

A steady, though not extravagant, reduction of our debt should be the fixed policy of the nation.

TREASURY REPORTS OF RECEIPTS AND EXPENDITURES CRITICISED.

In order to judge more accurately of the future of our expenditures, I ask attention to an analysis of those of the last fiscal year. In doing so I will venture a criticism on the form in which the records of receipts and expenditures are presented to us in the report of the secretary of the treasury. In preparing the analysis which I shall present I noticed

several items which I cannot regard as real expenditures, nor have they ever in fact been receipts of the government. In the report of the secretary of the treasury it is stated that the expenditures for the fiscal year ending June 30, 1871, amounted to \$292,177,188.25.

Now I call the attention of the committee to several items included in that sum, which, it seems to me, should not be counted in an exhibit of what it costs to run the government. For instance, in exchanging coin in the treasury for outstanding bonds, the premium on the coin is set down as revenue, and the premium on the bonds purchased is set down as an expenditure. Of course, the books of the treasury ought to show these transactions in full; but it does not seem to me that the two amounts should go to swell the receipts and expenditures of the government. The one is not revenue in the ordinary meaning of the term, nor is the other expenditure. Yet here, on pages 3 and 5 of the tables appended to the secretary's report, are set down as premiums on sales of coin nearly \$9,000,000, and as premiums paid on purchased bonds a little more than \$9,000,000. It seems to me the figures presented to the country ought to be the difference between the two sums, which difference in this case should be set down as part of the expense of managing the national debt. That difference, we find, is only \$123,954; yet by this record the government is charged with having expended over \$9,000,000 for that purpose.

Here is another item. I understand that when a ship arrives in port, and the merchant desires to get his goods at once, he makes a deposit at the custom-house of a sum larger than the amount of the duties; and when the amount to be collected is ascertained, the balance of his deposit is refunded. Now all the sums paid back to merchants in this way—sums which never belonged to the treasury, never were revenue in fact or in law—are charged as expenditures. On page 4, under the heading of *Miscellaneous Expenditures*, I find this item: "Refunding assets of deposits for unascertained duties, \$1,787,266.59."

There is another item which gentlemen who care to follow these remarks will also find on page 4. When imported goods are reexported, a drawback is allowed to the full amount of the duty. In many cases the duty does not come into the treasury at all, and of course the cancelling of the duty is not a payment out of the treasury. That sum should neither be reckoned as expenses nor as receipts; but yet \$978,358 of "debenture drawbacks under the custom laws" are set down among the expenditures for the last fiscal year. Both this and the preceding item are set down as a part of the cost of collecting the customs revenue.

Another item of \$490,670 for "refunding customs duties erroneously or illegally collected," which appears in the list of expenses, manifestly never belonged to the United States. The account of all these transactions should, of course, be kept at the treasury. Doubtless that is the correct method of keeping the books, but is not a just method of expressing to the people what their government costs.

There are two similar items in connection with the administration of the internal revenue department, amounting to more than a million dollars, in which the taxes were erroneously or illegally paid, and subsequently returned to the citizens who paid them; also, in the land office an item of repayment for land erroneously sold. Without troubling the committee with a more specific statement of the items, I submit the following table:—

Items stated in tables of the secretary's report as expenses of the United States for the fiscal year ending June 30, 1871.

Refunding excess of deposits for unascertained duties.....	\$1,787,266 59
Debenture and drawbacks under customs laws.....	978,358 33
Refunding duties erroneously or illegally collected.....	490,659 68
Internal revenue allowances and drawbacks.....	451,206 66
Refunding taxes erroneously or illegally collected.....	612,243 80
Repayment for lands erroneously sold.....	43,765 49
Premium on purchase of bonds.....	8,016,794 74
Refunding excess of deposits for surveying public lands.....	22,282 66

\$13,402,524 45

There are three other items which, I am inclined to believe, should go into this statement, and which would swell the amount to near \$15,000,000; but I omit them because I am not perfectly satisfied that they belong here. Now, of course, all these items appear on both sides of the ledger, and correctly represent the transactions. But our taxes and expenses are heavy enough without the addition of sums that apparently, but not really, swell the totals on both sides of the accounts.

I call the attention of the committee to the account of expenditures of the war department on page 5 of the secretary's tables. Gentlemen will see that the total expenditures of the war department are set down at \$35,799,991.82. Now, in order to get that sum, \$3,280,093, the proceeds of sales of ordnance, were deducted. That is, the war department sold ordnance to the amount of \$3,280,093, and used the proceeds to defray their ordinary expenses. But the whole of that sum is subtracted as though it were not an expenditure of the war department. It should manifestly be set down as a charge which the government has had to pay. It would be proper, of course, to account for it on the other side of the ledger as "receipts from sales of property," and doubtless it was so entered. But to cut it out of the total expenditures of the year because it was got from the sale of old property does not correctly state the expenditures of the war department.

I make this explanation before presenting a table which I shall present in a moment, and in which, for the sake of comparison, I have in the main followed the treasury mode of statement.

ANALYSIS OF EXPENDITURES FOR THE FISCAL YEAR ENDED JUNE 30, 1871.

In order more clearly to understand the nature of our expenditures, I have endeavored to analyze more closely some of the large groups set down in the secretary's report. For instance, I find under the head of Miscellaneous Expenses over \$40,000,000. It will be interesting to know some of the larger items of which that sum is composed. I find, also, that the war department appears to be charged with \$44,080,084.95 as the expenditures for the year. This sum contains many large amounts that do not properly belong to the expense of maintaining our military establishment. For example, an item of more than \$10,000,000 of bounty and back pay to soldiers of the late war is no part of the cost of maintaining our present army; also, \$2,379,246 paid to States to reimburse them for raising volunteers; also, \$4,884,277 for the improvement of rivers and harbors, and several similar items, which it would be very unjust to set down as the current expenses of our present army. The account should be so grouped as to do justice to all the departments of the government. In the following table I have followed the secretary's method of stating accounts in all respects except these. I have omitted the \$9,016,794 expenditure for premium on bonds purchased, and have put down only the \$123,954, the difference between that sum and the proceeds, from premium on sales of coin. I have also reckoned the \$3,280,093, proceeds of sales of ordnance, as money expended by the war department. These changes vary but little the total expenditure of the year from the statement of the secretary. In order to understand more clearly the nature of the expenditures for the last fiscal year, I will distribute the amounts into three groups, as follows:—

1. The amounts paid during the year on account of the late war:—

Interest on the public debt.....	\$125,576,565 93
Expenses for refunding the national debt.....	332,173 04
Difference between premium on bonds purchased and gold sold.....	123,954 79
Pensions.....	84,443,894 88
National asylum for volunteers.....	295,287 82
Bounties and back pay to volunteer soldiers.....	10,656,300 53
Reimbursing States for expenses of volunteers.....	2,379,246 72
Horses and other property lost in service in the late war.....	228,836 75
Illegal capture of British vessels and cargoes during the late war.....	750,728 72
Return of captured and abandoned property, and expenses of suits.....	753,540 09
Capture of Jefferson Davis.....	1,611 50
Total.....	\$175,543,140 27

Amount brought forward.....\$175,543,140 27

2. Present military and naval establishments:—

For the army, after deducting payments for the late war,
already mentioned in group 1, and for improvement of
rivers and harbors.....\$25,683,524 25
For the navy.....19,481,027 21

45,114,551 46

3. The civil service proper, being all the expenditures not
named in the first and second groups, namely:—

The civil list, being expenses of legislative, judicial, and
executive officers of the government, not including internal
revenue and customs departments.....\$15,802,599 98
Foreign intercourse.....1,604,373 87
Indians.....7,426,997 44
Improvements of rivers and harbors.....4,834,277 88
Public buildings and grounds, including repairs.....3,286,011 80
Expenses of mints, coast survey, light-houses, revenue cut-
ter service, and marine hospitals.....6,184,701 12
Cost of collecting customs duties, exclusive of revenue cut-
ter service, and building and repairing custom-houses... 10,543,199 60
Cost of assessing and collecting internal revenue.....9,001,680 71
Deficiency in revenue of the post-office department, includ-
ing carrying of free mail matter.....4,400,000 00
Expenses of the eighth and ninth census.....1,955,111 13
Mail steamship service.....731,250 00
Refunding of Massachusetts interest on advances for war
of 1812-15.....678,363 41
Survey of public lands.....564,940 76
Miscellaneous.....8,943,243 50

\$70,906,749 70

Grand total.....\$291,564,441 43

It will be seen that I have placed in the first group all those items of expenditure, exclusive of the principal of the public debt, which are paid directly for expenses of the late war. These items explain themselves, and amount to \$175,543,140.27. The second group exhibits the current military expenses of the government, excluding expenditures for the improvement of harbors and rivers, which is properly a civil expenditure, and also excluding payments for the late war, which belong to another group. In the third group I have placed the civil expenditures proper—all that does not belong to the first two groups. From this table it appears that of the expenses during the past year, 60½ per cent. of the whole amount—leaving out the payment of the principal of the public debt—was directly for the late war; 14 per cent. was for the support of our army and navy, and 25½ per cent. for all the other departments of the government. Or, stated more summarily, 60½ per cent. of all our expenditures of last year was for the late war, and 39½ per cent. for current expenses.

BRITISH AND AMERICAN EXPENDITURES COMPARED.

It will be interesting to compare this table with a similar analysis of the expenses of the British government for the past year, in a table which I have compiled from official reports, making the same three groups for the expenditures of that country as for our own.

<i>British Expenditures for 1871.</i>			
<i>Items.</i>		<i>Totals.</i>	<i>Per cent.</i>
Charges on the public debt (interest).....	£26,826,436		38½
Army.....	£13,430,400		
Navy.....	9,456,641		
	22,887,041		33
		£49,712,477	71½
All other expenditures.....		19,936,063	28½
Total.....		£69,698,539	100

The interest on the British debt is $8\frac{1}{2}$ per cent. of the whole annual expenditures. The cost of the army and navy is 38 per cent. of the whole. These two elements, being the cost of past and prospective wars, make $71\frac{1}{2}$ per cent. of the whole expenditure. All other expenditures of their government amount to but $28\frac{1}{2}$ per cent. It is curious to observe that their civil establishment costs almost the same as ours does. But while they pay 83 per cent. of all of their expenditures for their present military and naval establishments, ours costs but 14 per cent.—less than one-half of their rate.

APPROPRIATIONS FOR THE NEXT FISCAL YEAR.

Leaving these general considerations, I call the attention of the committee to the appropriations for next year, and to the bill under consideration. The committee on appropriations found that a most excellent example had been set last year and the year before by their predecessors. In almost every case of a continuing expenditure we found it safe to take their appropriations as the basis of our own. We have not yet gone over the eleven appropriation bills which we are required to present for the action of this house; but we have gone so nearly over them that I am able to state approximately what the result will be.

Gentlemen will remember that our appropriations are of two kinds, permanent and annual. The permanent appropriations are those provided for by statute to meet special obligations of the government as they arise, and for the payment of which no specific act of appropriation is necessary except the law which created the obligation. These include interest on the public debt, expenditures of national loans, repayment of taxes improperly collected, bounties and back pay to soldiers of the late war, property lost in the military service, support of the national asylum for disabled volunteer soldiers, marine hospitals, the Smithsonian institution, and many other similar expenditures. The amount of this class of appropriations for the next fiscal year will be about \$9,000,000 less than for the current year. The amount of permanent appropriations for the fiscal year 1871 was \$188,302,243; the amount for the fiscal year 1872 is estimated at \$168,601,861; and for the fiscal year 1873, at \$154,961,287. The other class of appropriations are those provided for each year in the regular appropriation bills. The amount of appropriations of this class made last year for the current fiscal year was \$162,096,526.60. In the corresponding bills for the next fiscal year the committee will recommend appropriations which amount to about \$152,000,000. We hope that when these bills shall have become laws the total amount appropriated in them will be at least \$9,000,000 less than the corresponding appropriations for last year.

In conclusion I call attention briefly to the legislative, executive, and judicial bill now before the house. As it stands in the print before us it appropriates \$17,772,758 for the fiscal year ending June 30, 1873. The corresponding bill of last year, which made appropriations for the current fiscal year, as it was first introduced, appropriated \$18,635,840. When it became a law the amount had increased to \$20,772,402. I am authorized to recommend some increase above the amounts named in the print before us; but I hope that increase will not carry the bill much, if any, above \$18,000,000. The estimates on which this bill is based call for the sum of \$20,009,418. The committee have cut down those estimates, so that the pending bill appropriates \$2,886,060 less than the estimates, and \$3,000,000 less than the amount appropriated for the objects last year.

Justice to the committee on appropriations of last year requires me to say that we claim no merit for the whole amount of this reduction. The leading item is a reduction of \$1,000,000 in the amount appropriated as compensation and mileage of the members of the house of representatives. We propose this for the reason that this appropriation bill will not apply to any congress but the present. This congress will expire on the 4th of March, 1873, and this appropriation is for the year ending on the 30th of June following. Under our present laws there will be no congress in session between March and June of 1873:

there will be no organized house until the following December. We thought it unnecessary to appropriate out of the treasury a large sum of money for a congress that will not assemble within the fiscal year for which these appropriations are made.

We have made a reduction of \$680,000 in the appropriation for assessing and collecting internal revenue, and that reduction is accomplished by a clause in the bill limiting the compensation of collectors of revenue to \$4,500 a year, which limitation, I hope, will meet the approval of the house. The work of collecting the internal revenue has been greatly reduced and simplified, and a general impression prevails that we pay too much money for the work. There are many other items of reduction which will be noticed as we proceed to consider the bill by sections. We have added a few legislative clauses to protect the treasury against fraudulent claims, and to cut off some expenditures which have grown up as a matter of custom, but which appeared to us unnecessary.

I may venture to say for the committee on appropriation that while they have endeavored to follow the line of rigid and reasonable economy, they have not forgotten the vastness and variety of the functions of the government, whose operations should be maintained vigorously and generously. It would be a mistake to cut down expenditure in any department so as to cripple any work which must be accomplished, and which can better be done at once and ended, by a liberal appropriation, than to let it drag on through a series of years by reason of insufficient appropriations. It is better to make a reduction of whole groups, when that can be done, than merely to cut down individual items. But I hope that members of the house will bear in mind that in many of our civil departments we have large forces of employés, which the settlement of war accounts made necessary, and which, when their work is done, it will require no little courage and effort to reduce to a peace basis. In doing so it would be well for us to adopt the sentiment recently expressed by Mr. Gladstone, in the house of commons, that—

“The true way to save is not the cutting down of single items, but a more complete organization of our departments, and the determination that for whatever the country spends it shall have full value in labor, talent, or materials.”

In conclusion, Mr. Chairman, I thank the members of the house for the patience with which they have listened to these dry details, and for the kind attention with which they have honored me. I yield the floor for any remarks which other gentlemen may desire to make, and then I shall submit the bill to the judgment of the committee of the whole.

OUR LECTURE SYSTEM.

THAT the American lecture system, as a method of public instruction, has not been a complete success, has been reluctantly admitted by some of its warmest advocates. The annual courses formerly presented under the auspices of lyceums, library companies, and other associations, have not maintained the high position to which, but a few years ago, they aspired. Of the eminent writers, essayists, and men of recognized literary attainments who were wont to appear from time to time before cultivated and exacting audiences, and to discourse upon subjects in such a manner as to afford both pleasure and profit, many have retired

from the lists. Even those who still pursue the vocation of public lecturers have recognized a change in the public taste. Speakers who once could depend upon drawing crowds to hear their remarks are now frequently rewarded by slim and spiritless audiences; and committees, who could formerly rely with some degree of certainty upon the attractiveness of well-known names, cannot now place the same dependance upon the success of their venture. As a purely business transaction, failure is often the result; or, to use a more expressive term, it often does not pay. The reason for this change in the public taste is difficult to explain; but that there has been a decided reaction must be admitted by all who have paid any attention to the subject. Whether the novelty of the thing has worn out; whether the themes which formed the thread of the lecturer's remarks have been exhausted; whether the restless desire for change—which is characteristic, to a certain extent at least, of our people—has produced the result; or whether the lecturer of to-day is not up to the average ability of the eminent thinkers and scholars of recognized literary acquirements who formerly insured large and appreciative audiences, it is difficult to assert. But, however impracticable it may be to account for the change, the fact is no less manifest that the system does not continue to receive the same verdict of approval that it enjoyed in its palmy days.

A retrospect of the names which formerly appeared in the yearly lists of lecture committees, and whose very mention created a thrill of pleasure at the anticipation of being numbered among their listeners, brings up recollections of evenings well spent, and of hours passed in the presence of minds alike distinguished for their breadth, refinement, and culture. To single out a few from the many of these leading examples, may be mentioned the philosophic Emerson, with his calm, placid manner and his deliberate utterances, which seemed as if each word and syllable had been cut and polished and inserted with all the nicety which the lapidary uses in fixing the costliest gems in their settings of gold. Whipple, too, the essayist *par excellence* of America, with his keen and subtle discrimination, his quick perception, and his salient thrusts of irony and sarcasm. Giles, the refined and cultivated Shakspearean scholar, and the author of those exquisite fragments which from time to time appeared from his pen; and Curtis, the accomplished and polished *howadj*, whose finished sentences and well-clothed thoughts were so highly appreciated by the throngs who frequented his lectures, may be instanced as types of those who but a few years ago formed the attractions—the bright particular stars—of our lecture system. Others of equal eminence might be mentioned; but of speakers of this class it is an admitted fact that but few now appear on the rostrum; or

if they are occasionally invited to address the public, they find their names placed in singular juxtaposition with speakers of a totally different grade, who for the present seem to possess the power of drawing hearers, and of filling the pockets of those who act as lessees or managers of courses.

While, among the lecturers who are now admitted to possess popularity, there are some of undoubted excellence, yet, taken as a class, they suffer much by comparison with those of whom the foregoing are examples. Other qualifications than those of eminence in particular departments of literature seem to entitle them to the consideration of the public; and while there are still a few who possess merit, and whose addresses may really convey valuable instruction and open up suggestive topics of thought, it is to be feared that the stars of less magnitude greatly outnumber them, and that in many of the modern lecturers who "draw," the chief attractions are a glib tongue, an *aplomb* suggestive of the age of bronze, a sensational topic, and a readiness to utter slang phrases which pass for wit.

Among specimens of this class, ambitious of the distinction of being considered "humorous," we regret to say that clergymen of a certain kind are sometimes found; and that some of the most inelegant, not to say vulgar, expressions owe their paternity to members of this profession. It is a fortunate circumstance, however, that but few of this honored class descend from the dignity of their sacred calling to exhibit an incipient buffoonry, which, if encouraged, would surely degenerate into something worse, and which might present a parallel with the senseless babblings which pass current as witty remarks in the sawdust ring of the circus. That certain preachers are ambitious of this distinction is but too obvious. A glance at the announcements of some of our lecture committees proves the fact. Not content with sensational utterances in their pulpits, or the occasional public addresses which fall within the scope of their regular duties, their craving for notoriety is such that they easily yield to the temptation to thrust themselves before the public; and in order to season their platitudes, to make them spicy, to bring them down to the comprehension of not over-critical auditors, they frequently violate every dictate of taste and culture, and receive the encomiums of those who think them "good fellows who can enjoy a joke."

As a means of intellectual enjoyment, no more delightful or profitable indulgence could be imagined than to listen to lectures delivered by men of the ability of those we have selected. If such, and such only, appeared among the attractions offered to the people, no fears of wasted time or disappointed expectations would be entertained. But in the enlargement of the lists of public speakers, superiority has greatly given way to

mediocrity. Names which are the labels of brains that never traced an idea to its results—brains which are the simple repositories of current opinions and phrases, now strive for equal honors with those of higher grade; and as the battle is not always won by the strong, fortuitous circumstances often give them a larger share of success than is achieved by merit. Then we have wit without analogy; and here come in many of the so-called humorists of the day. Men who have won a questionable reputation for wit by writing mis-spelled words, and who may perhaps have said a few clever things with applause, suddenly aspire to the position of public lecturers, and travel from place to place with such threadbare jokes, silly puns, and vulgar attempts to raise merriment as would disgust the "Bones" of a minstrel troupe.

The lecture system has afforded a means of sustenance for the professional agitator; and in this category are included public scolds of both sexes, who, to take them at their word, would overturn every time-honored fabric, whether social, political, or literary. There are some men who are never contented unless in constant antagonism with some imaginary wrong. Riding astride their well-nigh lifeless hobbies, like Don Quixote in the saddle of his faithful Rosinante, they are ever ready to charge gallantly on harmless windmills, or to set the lance in rest and gallop at defenceless sheep. Our social system, the labor question, women's suffrage, the public debt, the political outlook, and other topics, give opportunities to these misanthropic individuals for the display of much vehemence, in which they evince an aptitude for tearing passion to tatters which would gratify the most ardent admirer of the heavy villain in a third-rate theatre. Among speakers of this class there are members of all political parties, of every conceivable shade of opinion. That their discussions neither disseminate correct information nor convey proper ideas of the obligations and responsibilities of citizenship, must be conceded by every impartial observer. Under a thin guise of patriotic devotion to duty, a strong vein of personal importance crops out; and while ostensibly engaged in enlightening the public, all other considerations are generally made subservient to ambitious desires for notoriety or political preferment. To men of this class the rostrum affords a golden opportunity, the repeated use of which in the manner indicated has been undoubtedly one cause of the decline of our lecture system.

But, passing from the consideration of lectures upon topics of a literary or political nature, we would allude to the more important theme of science. Of all methods for explaining the harmonious interaction of natural laws and the phenomena which are revealed in the study of the universe, the system of oral instruction is the most attractive, and perhaps

the best. When the subject admits of experimental demonstration, a more fitting procedure could hardly be conceived. In some branches of natural science, the tentative method of enforcing the comprehension of fundamental laws is at once an aid to the memory and a demonstration of fact which impel immediate recognition; but beyond this, the experiments themselves are frequently of so beautiful a nature as to remain vividly impressed upon the memory, even after the descriptions which accompanied them may have been forgotten altogether.

Within a few years past, the interest in illustrated scientific lectures has largely increased. Wonders which are suggested by deeper inquiry into vital phenomena, the mystery of the world birth, the startling revelations of the sun's constitution, start thought from its old grooves. The rapid development of the mineral wealth of the country, the introduction of new processes of metallurgy, and the extension of the chemical arts, have created a desire for information pertaining to the theoretical bearings of these subjects. Schools of mines, institutes of technology, and polytechnic colleges have sprung up in various places; while departments of applied science have been attached to many of our older educational establishments—all supplying a want long felt, in the absence of which numbers of students were formerly compelled to resort to the ancient seats of learning in Europe. With the facilities thus offered to matriculants, a desire for information on these subjects has likewise sprung up among the public generally, and scientific lectures now form attractive and useful entertainments in most of our larger towns and cities.

Of the value of discourses of this kind there can be no doubt; and it is creditable alike to the taste and intelligence of the people that they are so highly appreciated. The great improvements which have been recently made in chemical and philosophical apparatus afford admirable facilities for illustrating the subjects under consideration; and when experiments are made subservient to the topic discussed, when they are used simply to enforce truths upon the mind, or when they are exhibited to illustrate important reactions and to prove the manner of their occurrence, they are most useful adjuncts—indispensable, indeed, to the proper comprehension of many of the metamorphoses of matter. But that even lectures of this kind may be abused, and that they may be diverted from their suitable channels, is unfortunately too apparent. Examples may be readily cited to show that mischief has already begun to work in this department of lecturing; and that in some instances a shallow running monologue, accompanied by a heterogeneous pyrotechnic display, is often palmed off on the public as a scientific exposition.

Within the past few years the residents of our large cities have been

favoured with opportunities of listening to addresses by some of our most widely known scientists. That these opportunities have been improved has been attested by the throngs which have attended their delivery. Many of these lectures have been models of their kind, the treatment of subjects being exhaustive, while the experimental illustrations were of the most convincing and attractive nature. Audiences have been held enthralled by the eloquence of the speakers and the manner in which they presented their themes, while the solid instruction thus imparted will be long remembered, and the information received will be treasured not only for its own sake, but likewise because of the clear and lucid manner in which it was given. Among lecturers of this class may be mentioned Silliman and Barker, of New Haven, Chandler, of New York, and Rogers, of Philadelphia—illustrious alike for the solidity of their acquirements and the ease and naturalness of manner with which they impart instruction. If all scientific lectures could be included in the category to which the addresses of these professors belong, there could be no word of criticism, no syllable of censure breathed against them. Utterly devoid of clap-trap, entirely free from sensationalism, characterized by a modest and sincere desire to instruct, and to use only such embellishments as are necessary, lectures delivered by such experts in science are to be regarded among the most valuable educational advantages to be enjoyed by the people.

As we have before remarked, there is great danger that even scientific lectures may be abused; or, rather, that superficial pretenders and aspiring mediocrities may usurp the authority which men of recognized ability now hold. To an audience incapable of discrimination, the rostrum affords a tempting opportunity for the charlatan, or for the empiric who allows his imagination to run riot, and who unfolds his budget of mingled fact and fancy under the alluring guise of "the fairy tales of science," or other inappropriate title. Science needs no "fairy tales" to unfold its marvels. Whoever knocks at its portals with a sincere desire for admission into its hidden paths, must lay aside all romantic ideas, and become an earnest student. The elements do not seek to become known as harlequins or columbines—as "matter kings" or "matter queens," as some loquacious itinerants might dub the familiar gases, oxygen and hydrogen—nor is chemistry to be acquired and understood merely because its study is accompanied with brilliant experiments. Lecturers who depend for much of their support by pandering to the desire of the public to be simply amused, mistake their vocation. There are men whom we could name who rate themselves among the foremost scientists of the age, who have never written a line or made an original observation in their chosen departments of science, and yet who are

ranked among the "brilliant" lecturers of the day. By some of these persons courses of lectures are given yearly. At one time the title may be "the marvels of modern science;" at another, "the wonders of modern science;" while again a new course is announced denominated "the blessings of modern science." In these monologues, the lecturer, surrounded with his paraphernalia, repeating his experiments *seriatim*, capping the climax by ending the performance with a show of remarkable brilliancy, almost conveys the idea that the listener is attending a *seance* of a necromancer, and revives recollections of a Hermann or a Blitz. In entertainments of this kind the egotism of the performer is his most striking characteristic. Forgetful of the fact that a lecture should convey information and be the means of imparting useful knowledge, the chief idea which seems to be impressed is that of the wonderful attainments of the speaker, who delivers his utterances as if science would be obliterated, and be only known as one of the lost arts, if he were not its embodiment!

And just here is the danger which lurks within the sphere of scientific lectures—a danger not inherent in the thing itself, but which, like a parasite, attaches itself to a healthy body and gradually extinguishes its vitality. Of parasites of this kind we could mention several examples, but it is to be hoped that their race will soon be run, and that a discriminating public will discern between the sound instruction given by those of whom we have named a few types, and the superficial and meretricious attempts of the others.

That lectures of a purely literary character have not retained their hold on the appreciation of the public, as we remarked at the outset, must be admitted; and yet there are those who will deny the proposition. That the standard has been lowered, that the average ability of the lecturer of the present time is below that of the representative public speaker of twenty years ago, is a fact to which assent must be given. That there are notable exceptions to this assertion we are ready to admit, but the rule is none the less true for this allowance. Evidence is at hand to prove it. But with regard to scientific lectures, an improvement of a marked character has taken place. The progressive nature of modern science, the discoveries which are almost daily announced, the growing taste for subjects of this nature, and the higher grade of education which scientific professors now receive, have all tended towards a common result—an earnest desire for instruction, on the one hand, and an improved facility for imparting information, on the other. And if a proper comprehension of the dignity of science be maintained; if the sublime truths which are to be learned are taught with a full sense of the responsibility attaching to the instructor; if the experimental illus-

trations are used simply to enforce and explain oral descriptions of the properties of matter, it would be hardly possible to place too high an estimate on the benefits which these lectures are capable of conferring. But when the intelligence of the people is underrated and slighted, as it is by scientific speakers of a certain class to which allusion has already been made; when the truth is presented as a nauseous dose of medicine which requires sugar-coating; when fanciful names are bestowed upon the elements and brilliant experiments are made as an alluring bait; when amusement rather than instruction is the object of the lecturer in order to "draw"—in such cases science is prostituted to ignoble uses, and if any knowledge at all is communicated, it is of so extremely superficial a nature as to be really worse than worthless.

But in these reflections, let it be understood that no disparagement is intended in regard to popularizing science. In the annals of treatises on subjects coming within the scope of chemists and naturalists, many examples have been furnished of popular expositions of scientific truths, which will long be regarded as models of clear and lucid descriptions of natural laws and the phenomena which accompany the reactions of matter. The admirable popular lectures and essays of Faraday, Tyndall, and Huxley may be cited as exponents of this style of instruction; and even Pepper, although sometimes tempted to overstep the bounds which separate the sublime from the ridiculous, has given lectures replete with information of the most valuable character.

We are living in an era which demands that persons of ordinary intelligence should possess more than a superficial acquaintance with natural science. A reasonable familiarity with philosophical subjects is a necessary element of a modern liberal education. To the great mass of the people who have already passed the age for obtaining instruction in schools and colleges there remain but two sources of information—books and lectures. Of these, both are available, and both are eagerly sought. It may be declared that both are equally indispensable; and while it is true that each has its peculiar merits, it must be conceded that a lecture—comprehensive, clear, well expressed and illustrated—oftentimes conveys a much more vivid and lasting impression than can be derived from books. In view of this fact, the importance of the lecture system cannot be overrated, and it is to be hoped that it may attain a rank and position which will secure it from the vicissitudes which might undermine its value. At all events, let it be purged from meretricious adornments; and if literary lectures do not now command the support to which they formerly laid claim, may it be long before science becomes degraded by those who would, for their own aggrandizement, bring it to the level of an ordinary amusement.

MINING AND METALLURGY.

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A RETROSPECTIVE glance at the development of the iron manufacturing interests of this country affords gratifying evidence of a healthy progress attained within the past few years. Not only has the mere increase in production exhibited a growth beyond the expectations of even those who entertained a high idea of the capacity of the country as a producer of iron, but the varied character of the product, and the diversified nature of the branches of industry in which the metal is the chief material consumed, all testify that the enlargement of this special department of metallurgy has more than kept pace with the development of other manufacturing resources. Among the striking characteristics which have marked the recent progress of our iron interests, have been those in which a liberal spirit of advancement has been manifested, and an enlightened policy pursued in regard to improved processes. The extreme conservatism which once threatened to confine the operations of the ironmaster to the routine of a mere handicraft, has given place to more intelligent comprehension of the benefits which are to be expected from the application of science; and with the gradual acceptance of this belief a marked improvement in the character of product, as well as in the details of manufacturing operations, has become apparent.

One of the most decided movements in this direction has become manifest in the introduction and steady progress of the manufacture of Bessemer steel, which may now be considered one of the prominent metallurgical interests of the country. The early history of this invention is one of great interest, and, as has so often been observed in the record of the introductions of improved processes, the patents of different inventors threatened to clash, and in one instance actual litigation was resorted to. The claims of Kelley, Bessemer, and Mushet—all of whom proposed to decarburize iron by the pneumatic process—possess some points of similarity; but there is no doubt that to Bessemer alone is due the credit of having, amid almost endless disappointments and discouragements, successfully accomplished results which others but partially and imperfectly attained. It was in 1855 that the first steel was made by Bessemer's pneumatic process. Kelley had attempted the same principle—that of furnishing air to the molten iron under pressure—but what he failed to accomplish, Bessemer was successful in performing. Kelley forced a sluggish air blast through molten pig-metal, through a very small number of tuyeres, so that while but a small proportion of the iron could be exposed to its influence, the remainder cooled. Bessemer forced a blast of great violence through more than one hundred small orifices, by which it was distributed throughout the entire mass of metal, thoroughly oxidizing the carbon and silicon, and largely increasing the temperature—which rises to 5,000° Fahrenheit—and thus making entirely practicable what Kelley had failed to do. But something more was needed than the removal of the oxidizable impurities. The addition of *spiegeleisen* as practised by Mushet in his invention was

required, and by the combination of these patents all difficulties were removed and the interests of all parties harmonized.

The introduction of the Bessemer process into the United States is due to the energy and enterprise of John A. Griswold, of Troy, whose attention was first seriously called to the subject in 1863. In the following year, having become convinced of the value of the improvement, he commenced negotiations with Mr. Bessemer, which were consummated in 1865, by which the patents for this country were sold to Mr. Griswold and his associates. Prior to this time the Bessemer steel works of Troy were started on a small scale, and the success of the process demonstrated; and so clearly pronounced was this success that works at Harrisburg, Cleveland, Chicago, Johnstown, Brazil, and other places, were erected—the greater part of them having a very large capacity.

That the principles underlying Bessemer's process are both chemical and mechanical has been proved by experience. This idea is well expressed by one of its enthusiastic advocates as follows: "The chemical reactions will look out for themselves, but they must have an adequate chance, and this is what Bessemer for the first time gave them by mechanical means, namely, the mechanical force of numerous blasts—not sluggish drafts, but roaring blasts of air, blowing the melted iron all into spray, so as to give the oxygen and the carbon hundreds of square feet of surface contact, and that every drop of iron should be enveloped with the air. Thus, and thus only, the combustion is so perfect and rapid, and so diffused through the whole mass, that the two grand desiderata are attained—first, the decarburization is effected without the aid of fuel, and second, the product is liquid and can be cast into homogeneous masses."

Of the future of the Bessemer process in this country it is, of course, impossible to speak positively; but there is every indication that its extension will be very great, and that it will form one of the most important branches of the great iron industry which is destined to be one of the leading—if not the very first—manufactures of the Union. The rapid strides it has already made since the comparatively recent date of its introduction afford an example of what progress it may make in the future. Steel for rails and other purposes is becoming greatly in demand, and while we have so many facilities for producing it, it will be manufactured in increased quantities.

—MR. W. MATTIEU WILLIAMS has communicated to the London Chemical Society some observations on the peculiar characteristics exhibited by iron and steel which has been damaged by reheating, and which is designated by the workmen as "burnt iron." The same name is also given to iron which has been excessively heated, and exposed in the puddling furnace *after balling*, for no amount of heat applied to iron in the blast furnace, or in the early stages of puddling, produces burnt iron. The peculiarity of this condition consists in its brittleness, shortness of fracture, and a display of an approach to a crystalline structure. Burnt iron also loses the fibrous structure and silky fracture of good iron. Steel which has been raised to a yellow or white heat, and then suddenly cooled, becomes brittle, and is no longer capable of being tempered, and is worthless, or nearly so, for the ordinary uses of steel until again raised to a welding heat, and rolled or hammered, and allowed to cool gradually. Burnt steel has a coarse granular fracture; the facets of the granules being, for the most part, either rounded or conchoidal.

In the course of his examination of many samples of burnt iron, Mr. Williams found in all of them particles of black oxide more or less abundantly diffused throughout the mass of metal. In burnt steel he could not detect the presence of oxide or any other indication of internal oxidation of iron. In order to determine whether the defects of particular samples of iron were due to burning, he devised a simple means of determining the question by treating about a decigram (about a grain and a half) of borings or filings in a test tube with three cubic centimetres of nitric acid diluted to a specific gravity of 1.20. If the iron is burnt, the particles of dark oxide become separated from the metallic iron as it dissolves, and are suspended in the liquid, rendering it dark and turbid. By their

ultimate solution in the acid they may be readily distinguished from particles of carbon, for which they might otherwise very naturally be mistaken. By thus treating equal quantities of borings of good and burnt iron, and comparing the reaction, the difference may be easily noticed.

Ordinary sound wrought-iron contains a small quantity of carbon, which appears to exert an important influence by preventing burning, or oxidation, by its reducing tendency. When the carbon is removed, oxidation commences when the iron is heated, and this oxidation is not merely superficial, but extends throughout the mass. The higher the temperature and the greater the amount of exposure to the atmosphere when heated, the greater is the quantity of carbon required for protecting the iron. This, Mr. Williams thinks, is the reason why all attempts to make merchantable iron by the Bessemer process have proved failures: the high temperature and the violent exposure of melted metal to the air forced through it, causes oxidation to commence even in the presence of much carbon. This oxidation commences in the Bessemer converter, when the proportion of carbon is brought down as low as 0.20 to 0.25 per cent. In this connection he remarks: "I find that iron attains its maximum toughness when it is otherwise pure, and its carbon reduced to the lowest possible proportion without oxidation commencing. Thus, the success of the maker of armor-plates, ship-bolts, etc., depends upon his skill in exactly touching, without passing, the point at which the oxidation of carbon ceases, and that of the iron is about to begin. By skilfully conducting his last reheating processes by means of a reducing flame, he is able to work down to the lowest possible trace of combined protecting carbon, and thus obtain the maximum of toughness and extensibility."

From a large number of experiments, the conclusions arrived at by Mr. Williams were that whenever steel is raised to any temperature above the lowest visible red heat, and more or less exposed to the action of atmospheric air, its carbon is oxidized with a rapidity proportionate to the temperature and degree of exposure. These experiments extended through a series of various conditions, from low heat and closed annealing furnaces to the great heat and exposure of the Bessemer converter. This oxidation occurs not only at the surface, but proceeds inwards; and as it is well known that certain gases can pass readily through heated iron, the permeation of oxygen and the exclusion of carbonic oxide no longer present any difficulty. He explains the structure and properties of "burnt steel" as the result of suddenly solidifying it from the viscous condition which it attains at welding heat, and thereby imprisoning the carbonic oxide evolved by the oxidation of the carbon. By slower cooling the carbonic oxide would have become either occluded or expelled. This explanation accords with the fact that burnt steel may be cured, as above stated, by welding up the cavities—or "toads eyes," as the workmen call them—which are visible on the fracture of such steel. These are, according to Mr. Williams's explanation, the minute bubbles formed by the carbonic oxide suddenly arrested in various stages of evolution or collapse. From the foregoing observations, the workmen's term "burnt" is correctly applied—the rottenness of both iron and steel being caused by the presence of intermingled particles of combustion products breaking the continuity of the metal. In "burnt steel" the carbon is burnt, while in "burnt iron" the iron itself has suffered oxidation.

—Among the mining and metallurgical interests of the State of Missouri, the production of lead and associated minerals still holds a position of no small importance. In Washington county alone there are about fourteen lead-smelting works in successful operation. Of this number but seven have presented reports of their operations for 1871; and from the data thus furnished, the aggregate production of all the mines of the county must be very large. The total quantity of pig-lead smelted at the works from which reports have been received was 2,464,914 pounds, divided among the several establishments as follows:—

	Pounds.
William Long, Old Mines.....	541,832
James Long & Co., Potosi.....	442,290
F. Desloge, Potosi.....	434,500
St. Louis Lead Mining Company.....	401,879
Missouri & Pennsylvania Lead Company.....	283,976
John Evans, Hopewell.....	288,328
J. Teasdale & Co., Potosi.....	123,289
Total.....	2,464,914

The furnace of F. Desloge is situated at the mouth of a very deep shaft, where mining has been prosecuted since 1818. If full and accurate statements could be obtained from all the lead works now in operation, there is no doubt that the aggregate production would appear much larger than is generally supposed. Washington county contains many rich mineral deposits, embracing besides the ores of lead, zinc blende, and a great abundance of barytes, which occur as a gangue with the galena. This mineral is now shipped in large quantities, the total amount forwarded from Cadets in 1871 being 7,500,000 pounds. Many of the mines in this part of Missouri are worked only a part of the year. Some of them are located on farms whose owners devote their attention to extracting ores only during the winter season, when there is no great demand for their devotion to agricultural pursuits. With persistent work, and a correct knowledge of the deposits, a great improvement in the production might be made. Under the guidance of skilled mining engineers, and with a sufficient capital, these localities might be made to pay handsome returns.

The first mining operations in Missouri were commenced in 1720 in the galena region of the State. The early explorers of this section, like most of the adventurers who are tempted to brave the hardships of the wilderness, were in search of the precious metals; but being disappointed in their expectations they turned their attention to the development of the lead mines which were discovered. Prominent among these explorers was the French mineralogist La Motte, from whom was named the celebrated Mine La Motte, one of the earliest known and most important deposits in the West. Although spasmodic attempts were made to work this locality soon after its discovery, systematic mining operations were not begun until 1798, when a reverberatory furnace was erected by Moses Austin, who also built a shot tower. Mr. Schoolcraft, in his *View of the Lead Mines of Missouri*, states that in 1819 there were forty-six mines in operation, and the extent of their development may be inferred from the fact that one of them—the Shibboleth—in 1811 is said to have produced 3,125,000 pounds of lead from 5,000,000 pounds of ore; while two others—the Mine à Burton and the Potosi Diggings—together produced in the eighteen years from 1798 to 1816, 9,630,000 pounds of lead.

These Missouri lead deposits are very similar in their geological relations to those of the upper Mississippi. They are not true veins, but are limited in extent; and while some of the workings have been carried down to a considerable depth, a great proportion of the ore lies near the surface, and is found in flat sheets or large caverns characteristic of most of the galena regions of the Mississippi valley. Some of the deposits have furnished a great variety of minerals, and have contributed cabinet specimens of rare beauty. Among these may be mentioned the Mine La Motte, which has produced ores of lead, copper, manganese, cobalt, and nickel; and, indeed, at one time it was quite an important source of the two last named metals, which were not only refined in this country, but smelted into a rich matte and shipped abroad.

—DURING the past three years the quicksilver mining companies of California have not been idle, although the aggregate production of 1869 exceeded that of the two following years, while in 1868 the number of flasks made was largely in excess of the yield of any similar period. The quantity furnished by the different mines was as follows:—

	1869. Flasks.	1870. Flasks.	1871. Flasks.
New Almaden.....	17,000	14,000	18,768
New Idria.....	10,450	10,000	9,227
Redington.....	5,000	4,546	2,128
Sundry others.....	1,150	1,000	1,768
Total.....	33,600	29,546	31,881

The exports for the last four years were as follows:—

	1868. Flasks.	1869. Flasks.	1870. Flasks.	1871. Flasks.
To New York.....	4,500	1,500	1,000	800
" Great Britain.....	8,500	.....	.....	.....
" China.....	17,785	11,600	4,050	7,900
" Mexico.....	14,120	8,080	7,088	3,081
" South America.....	2,500	2,900	1,300	2,200
" Australia.....	1,580	800	800	1,100
" British Columbia.....	20	4	9	6
" Other countries.....	501	51	41	118
Total.....	44,506	24,415	13,788	15,905

From the above figures it will be seen that China is the largest consumer among all foreign countries. A very large proportion of the quicksilver mined in California is used in amalgamating the gold and silver ores of that and the other Pacific States and territories—more than half of the product of last year having been thus consumed.

The exports of quicksilver from 1852, when mining may be said to have fairly commenced, have been as follows:—

Year.	Flasks.	Year.	Flasks.
1852.....	900	1860.....	9,448
1853.....	12,787	1861.....	35,995
1854.....	20,968	1862.....	33,747
1855.....	27,165	1863.....	26,014
1856.....	23,740	1864.....	36,927
1857.....	27,262	1865.....	42,469
1858.....	24,142	1866.....	30,287
1859.....	3,399	1867.....	28,853

The most important quicksilver mines in Europe are those of Almaden in Spain, and Idria in Austria, from which the two leading mines in California have taken their names. Of these the Almaden has been worked from remote antiquity, as Pliny states that the Greeks imported cinnabar from this locality seven hundred years before the Christian era, and that during his time Rome annually imported 700,000 pounds. There are also mines on the left bank of the Rhine in Germany, which, although bearing no comparison in extent or richness with those of Spain or Austria, are nevertheless worked with some success. In Peru and Mexico there are extensive deposits of quicksilver ores, some of which are worked to a great extent; but in the absence of reliable data concerning their production, it is difficult to assign them to any definite rank among other sources of the metal. In China extensive deposits of cinnabar exist, some of the ore being of very high grade; but notwithstanding its occurrence in this empire, large quantities are imported from this and other countries, as the foregoing figures show.

—In the Pacific States and territories the precious metals occupy so high a position, and are sought with such avidity, that the claims of baser products are sometimes overlooked. In a recent number of the *Engineering and Mining Journal*, Mr. Wm. L. Faber calls attention to an interesting locality in Nevada, where ores of antimony of high grade occur, situated in Humboldt county, twelve miles from Battle Mountain station, on the Central Pacific railroad, five hundred and forty miles east of San Francisco. At this

place two parallel veins of ore have been discovered, both of which have opened, and their character revealed. One of them, called the Mountain King, has been explored to a depth of fifteen feet, exhibiting from surface to bottom a continuous vein, two feet thick, of solid sulphuret of antimony. The vein is described as being perpendicular, with well-defined, regular walls, clearly cutting the country rock. The other vein, the Columbia, is not quite so regular or well-defined, but in a width of four feet averages fully two feet thick of solid ore. From the excavation made on this vein one hundred and fifty tons of clean ore have been removed, which, when rough dressed, yields the following average analysis:—

Moisture.....	2.82
Alumina (clay).....	1.58
Silica.....	12.62
Antimony.....	62.28
Bismuth.....	6.63
Sulphur.....	15.31
Oxygen (calculated).....	4.06
	<hr/>
	99.30

The great purity of this ore, and the absence of lead and copper, are regarded by Mr. Faber as peculiarly important and interesting features. The process of reducing the metal is simple and inexpensive, as he has proved on a working scale by smelting the ore in a reverberatory furnace with the native alkali found in the vicinity. The details of expenses and probable receipts are thus given: "Mining the ore by contract costs \$2 per ton; hauling from the mines to the station costs \$4 per ton; freight to San Francisco, \$10 per ton; to England, via Cape Horn, say \$15 per ton, meaning always the short ton of 2,000 pounds. The ore is worth in England from £12 to £15 per miner's ton of 2,352 pounds, equivalent to about \$50 to \$62 for 2,000 pounds. The regulus is worth from 12 to 14 cents per pound." From the above figures it appears that a profit of from \$19 to \$31 per ton may be realized from working these mines; and if the veins continue to present the same favorable indications when they shall have been more fully developed, this locality may perhaps become the seat of an important mining industry, and afford an example of the diversified mineral production of a State hitherto regarded merely as a repository of gold and silver. These ores contain silver, ranging from three to twenty ounces per ton; but, as Mr. Faber remarks, this yield is too insignificant to be regarded: the chief, if not only value they possess is in their content of antimony.

—THE Gap nickel mine in Lancaster county, Pa., has been developed to a depth of over 200 feet, and has been worked for about seventeen years. The length of the lode as thus far explored is about 8,000 feet, the ore-bearing portion varying in width from six inches to upwards of forty feet. The yield of ore is from 400 to 600 tons per month, and the number of men employed is about 175. The ore is raised by a small horizontal engine, and automatically dumped into an iron car, by which it is run into the ore-house, where it undergoes sorting and buddling, in order to concentrate it and to free it from gangue prior to its being smelted into matte. The ore from the Gap mine is a nickeliferous pyrrhotine, containing a small percentage of copper. In the dressed ore it averages about 8½ per cent. of nickel. The gangue is chiefly hornblende—very tough, and nearly black in color. In the metallurgical treatment of this ore it is roasted, and subsequently smelted in small blast furnaces, the product being a matte, which is shipped to Camden, N.J., and treated by the humid process. These are the only works in the United States where metallic nickel is refined. In the vicinity of Litchfield, Conn., there are large deposits of nickel ore, some of them very promising, and one which has been worked to some extent producing a large amount of high-grade ore—averaging three per cent.—for this is a good yield for nickel. These ores have been largely shipped to England, but at present, we believe, the mines are not worked.

—A CORRESPONDENT writing to an exchange from Texas refers to the undeveloped mineral wealth of that part of the State lying east of the Trinity river and north of Jasper and Newton counties, where large quantities of iron ores are said to occur—much of it being found in the shape of boulders strewn over the surface of the ground. In Rusk, Cherokee, Harrison, Marion, Upshur, Smith, Titus, Cass, and Bowie counties these indications are said to be very abundant. In Marion county the iron deposits have been worked to some extent. A furnace was erected there a few years before the war, and a considerable quantity of pig-metal made; but it has not been in operation for some time. Since then a small furnace has been built, which is still in blast, producing about six tons of pig-metal per day, some of which has been shipped to St. Louis in order to ascertain its value as a material for car wheels, as the iron smelted in the old furnace was pronounced to be superior for this purpose. There is no deep mining done, as there is enough ore on the surface of the ground to supply the small furnace for some time to come.

Of the mineral wealth of Texas very little is positively known; but from the limited information which exists on the subject, it is more than probable that future developments will prove it to be one of the richest States in the Union. A few years ago it was the intention of the Memphis, El Paso and Guyamos Railroad Company to have a thorough geological survey made of the region of country through which their line was projected; but for some reason this has not been carried into effect. Such an investigation would doubtless be extremely serviceable to the interests of the company—to say nothing of the general benefits which would be conferred by the examination. In the present unsettled condition of the State, with a treasury depleted by the effects of the war, it is scarcely probable that a State survey will be authorized; and yet, heavy as the expense would be, it would tend to make the resources of the State better known, and would be instrumental in inviting immigration which would far more than repay the outlay. Hitherto the agricultural and grazing lands of Texas have formed the chief attraction to settlers, but when the mining and manufacturing resources of the State become revealed, a much more rapid influx of permanent residents may be expected.

—We have referred to the fact that the growing scarcity of iron ores in England has caused foreign sources of supply to be sought, and that the hematites from Bilbao in Spain are being shipped to English ports in large quantities. Notwithstanding the repeated denials that an unusual scarcity of ores is being felt in the United Kingdom, the fact that foreign ores are being bought with avidity seems to prove the truth of the assertion; and the eagerness which is manifested by British capitalists to embark in enterprises of this kind affords additional evidence that the needs of ironmasters are pressing enough to justify the expectation that a steadily growing market will be had for foreign ores. The scarcity of English ores is further exhibited from the fact that within the past two years the price of hematites has nearly doubled. The mines of Bilbao have been worked from time immemorial, and, according to the *Mining World*, they are celebrated for the purity of their ores no less than their high yield of metal—averaging from fifty to sixty per cent. of metallic iron. One of these mines, La Escarpada, is described as a mountain of iron ore. It is about twelve hundred yards long, seven hundred yards high, and of unknown depth. The ore can be worked by mere quarrying, in quantities only limited by the labor employed, and at a cost which, including all charges, is estimated at only nine pence per ton. Labor is cheap and abundant, and it is said that the ore can be raised and placed on vessels at a cost of three to four shillings per ton, including royalty. It is proposed to build steamers to carry the ore to British ports, so as to insure regular deliveries. The maximum estimated cost of freights is ten shillings per ton, so that the ore can be delivered at ports in South Wales at from thirteen to fourteen shillings per ton. English hematites cannot now be bought for less than thirty-two shillings; and for

some time the price has not been under eighteen shillings, a fact which will insure a fair profit on the Spanish ores.

—We recently alluded to the fact that smelting works for the reduction of the rich argentiferous ores of Utah, Colorado, and other western territories, are about being erected at Pittsburgh. A number of enterprising citizens of St. Louis are likewise taking steps to build metallurgical works in the vicinity of that city for the same purpose. A location comprising about six acres has been purchased on the line of the Missouri Pacific railroad, near Cheltenham, and preparations are now being made for the erection of the necessary buildings, furnaces, &c. The St. Louis Smelting and Refining Company, which is the title of the corporation, starts with a capital stock of \$250,000, and includes among its directors some of the most prominent and successful business men of the city. The situation of these projected works is eminently favorable. By the Missouri Pacific railroad it is placed in direct communication with the mines, and on this score it possesses decided superiority over Pittsburgh, by reason of a shorter transportation; while the low price of fuel and labor gives it advantages which few other localities can claim. With proper management there ought to be no question of success. Offers have been already received from Arizona, Colorado, and Utah, to ship large amounts of ores; and when a steady market can be assured, an additional impetus will be given to mining in these remote regions. Although the distance the ores will have to be transported seems great, yet the cheapness of fuel and other advantages more than overcome this objection. The erection of these works is a step in the right direction, and affords a gratifying evidence of progress.

—In the manufacture of steel by the Bessemer process it is usual to allow the ingots, after casting, to become cold, and afterwards to reheat them in furnaces before hammering or rolling. A change in this part of the process has been proposed by John Birch, of Newton Heath, England, who by retaining the heat in the ingot, avoids the necessity for reheating. Mr. Birch thus describes his invention: "I am aware that attempts have been made to work the ingot direct from the converting pit; but these have failed, in consequence of the outside of the ingot being too cold while the inside has been too hot. I propose to remedy these defects by enclosing the ingot immediately it is taken from the mould in a suitable chamber, made of fire-resisting and non-conducting substances, such as fire-brick, powdered charcoal, graphite, asbestos, lava, pumice-stone, small coke, or any other suitable substances to prevent the heat from radiating from the external part of the ingot, and thus preserving its temperature until the interior is properly set, and the time arrives when the further manipulation or treatment can be more successfully carried out."

—In England the high prices for iron, which have been maintained for some time, still continue. A great demand exists for iron of all grades, and manufacturers find their capacity taxed to the utmost degree to supply the demand. A new and unexpected difficulty is now threatened. The coal supply is not equal to the emergency, and according to the reports from Birmingham, there is danger that some of the leading works of that city will be compelled to suspend operations for want of fuel. In every iron-making district the scarcity of coal is one of the great troubles; not from a failure of the mines, or an exhaustion of the workable seams, but simply because the demand for all grades of iron has increased so rapidly that colliers have not kept up with the necessities of iron-masters. In a short time it is probable that the demand and production of coal will be more nearly equalized.

—Very slight traces of impurities render gold crystalline and brittle. Even one-nineteen-hundredth of one per cent. of lead, antimony, bismuth, or arsenic, will produce this effect. These impurities may be removed by chlorine. Silver from ancient graves in the island of Cyprus was found to be brittle in consequence of changes in its molecular condition which had taken place in the course of centuries.

INSURANCE.

SUPERINTENDENT MILLER issues a chart of business and standing of fire and fire-marine companies reporting to his department for 1871. The whole 142 companies show a total cash stock capital of \$43,257,020, of which \$9,008,961 were made up in 1871. Total assets, \$98,861,530.22. The 84 State companies exhibit a slightly greater capital than the 58 companies of other States, but less gross surplus. Total liabilities, including capital, \$75,907,602.25. Of the total loss payments in 1871 by the 142 companies, viz. \$33,411,672.22, a small fraction beyond one-half, viz., \$16,780,048.86, was paid to Chicago. Total amount insured December 31, 1871, \$3,943,478,415, the net assets being \$66,210,947.97, showing absolute resources equal to 1.69 per cent. of amount insured.

If there were no other reason, this exhibit of the general position of the fire insurance interest itself gives imperative emphasis to the urgent call for adequate rates of premium. Chicago is about forgotten, but that which it proved cannot pass away from the facts of fire underwriting, namely, that the probability of fire loss is greater and vaster than the underwriters anticipated. Ordinarily, we may assume that fire will burn in a year one-half of one per cent. of total sum insured, and 90 per cent. of this burning will be upon classes of property constituting a small fraction of aggregate insured value. Then somehow at times good risks will burn as well as bad ones, and the ratio of burning advances beyond the average we have named, and in the case of Chicago evidences that a single fire can burn fully two per cent. of the total insured values of the country. The companies we have referred to write two-thirds of the amount at risk covered by the American fire offices, and the other companies are rather weaker than stronger with respect to asset proportion. Our fire liability increases each successive decade, though fluctuating year by year, and the increase is less in the mere occurrence of combustion than in the values destroyed.

Our rule is to insure against probabilities, not against possibilities; but we know not where is the dividing line between the two, and we are apt to assign what belongs to the former to the latter. We should know, however, that the former is encroaching upon the latter, or, rather, comes into a place the latter had filled. What yesterday was but possible is to-day within the probabilities. Fifty years ago it would have been physically impossible in the United States to have consumed fifty millions by one conflagration. Now we have demonstrated our capacity to burn up a hundred insured millions from one spark, and that within twenty-four hours. Further, the probable advances in proportion with the possible, and the insurer who writes from the same standpoint that he did before Chicago, does like he would do who would conduct American fire insurance upon the fire experience of Europe. Chicago was not a merely exceptional disaster, it was a revelation; a discovery, in its significance that our fire insurance was not what it should be.

Losses are paid by premium. Payment is insured by premium, supplemented by capital, in event of premium deficiency; but premium deficiency is the destruction of capital, and capital and surplus are but good for a certain percentage of premium deficit; they are not the absolute universal safeguard. If premium does not come up to the line of advanc-

ing contingencies, there is no insurance. The strongest company is the one that gets the highest rate on the classes of hazards. Cheap companies are necessarily weak ones. Frequently the low rates are taken through a misunderstanding of the hazard; and if any one can afford such a company's policy, the company can readily afford to issue it, *i. e.*, to take the premium. In fire insurance matters "you pays your money and you takes your choice;" and there is this certainly about your choice, you'll never get more than you pay for. As between cheap insurance and no insurance, it will be much better to save premium, as then there will possibly be that much left with which to start again after the fire, besides the moral result of not encouraging frauds and deceptions.

—A RENEWAL certificate of authority to do business in New York has been issued to the American Insurance Company of Jersey City. The company has therefore this vindication of its soundness as a reply to the aspersions which have been cast upon it. The special commissioner appointed to examine the company by the New York department was Hon. Charles H. Raymond, an unquestioned expert, whose qualifications and experience command assent to such judgment as he might pronounce in a matter of this kind. The investigation occupied the month of January last, and showed the company to have \$30,209.74 of gross surplus above its cash capital of \$250,000. Total assets as follows:—

Bonds and mortgages on real estate in Jersey City and Philadelphia, worth more than double the amount	\$209,400 00
Cash in bank	51,049 35
Cash in hands of agents in due course of remittance	38,949 05
Leases held by the company, worth a yearly revenue of \$8,000.	16,893 46
Accrued interest, not yet due	6,730 38
Loans on collaterals	2,000 00
Value of furniture in Home and New York city offices	5,000 00
Bills receivable for premium	187 50
	\$330,209 74

Messrs. Kremer & Elmes, active underwriters and good business men, are the Pennsylvania agents of the American.

—In advance of his annual report, Commissioner Clarke, of Massachusetts, issues a summary of the standing of all fire, marine, and fire-marine insurance companies authorized to do business in the State December 31, 1871, excepting the European offices. Apart from the results of the Chicago fire to bankrupt fire companies, the condition of Chicago damaged fire companies and the effects of the whale fishery disasters upon New Bedford marine companies, the general position of the State companies is without material change for the year. We note the following:—

COMPANY.	Cash Income, 1871.	Cash Expenditure, 1871.	Gross Assets.	Surplus (+) or Deficiency (—) Dec. 31, 1870.	Surplus (+) or Deficiency (—) Dec. 31, 1871.
National Fire, Boston	\$308,951	\$1,156,550	\$396,631	+\$205,474	—\$61,348
Peoples Fire, Worcester	751,783	870,466	800,293	+208,799	+11,875
Springfield Fire, Springfield....	977,915	908,782	1,055,106	+126,560	+68,189
Commercial Mut. M., N. Bedford	67,612	95,175	299,352	+42,708	—14,168
Ocean Mut. Mar., New Bedford..	199,389	166,940	183,499	—47,247	—160,501
Union Mut. Mar., New Bedford..	371,052	912,391	361,613	+270,417	—328,608

We cite from the commissioner's tables the following columns in respect to companies of other States, omitting reference to new companies having no report of year's business, and California companies, whose statements were delayed with California mails.

Fire, Marine and Fire-marine, and Inland Insurance Companies doing business in Massachusetts in 1871.

Company.	Amount at Risk.	Cash Income in 1871.	Dividends paid in 1871.	Cash Exp. in 1871, incl. Div.	Surplus(+) or Deficiency(—) Dec. 31, 1870.	Surplus(+) or Deficiency(—) Dec. 31, 1871.
Ætna, N. Y.	\$691,277	\$855		\$2,834	f	+ \$779
Ætna, Hartford.	290,084,987 ^a	4,663,794	\$660,000	6,657,472	+ \$916,226	—256,716
Alemannia, Cleveland.	7,377,912	207,210		200,368	*	+33,939
Amazon F. & M., Cinn.	11,236,982	199,827		72,878	g	+55,173
American, Philada.	24,273,106	237,920	60,000	172,592	+357,765	+374,793
Andes F. & M., Cinn.	81,005,448	2,396,212 ^d	100,000	2,321,277	+60,554	—162,123
Arctic F.M. & I., N. Y.	11,884,845	125,914	24,418	93,520	*	+32,236
Atlantic Mut., M., N. Y.	81,085,450	5,183,055		8,581,340	+2,087,201	+2,364,081
Brew. & Malt., F. & I., N. Y.	9,341,197	86,054		80,556	*	+3,089
Citizens, N. Y.	53,288,804	350,150	49,441	287,232	+95,867	+308,601
City, N. Y.	14,406,599	97,701	30,000	67,178	+225,195	+255,745
Columbia, N. Y.	19,904,228 ^b	167,156	30,000	167,390	+86,306	+86,544
Commerce, Albany.	21,997,352	393,733 ^e	40,000	656,712	+115,887	+67,670
Commerce, N. Y.	7,776,282 ^b	74,484	20,000	80,109	+25,369	+14,370
Commercial, N. Y.	19,678,587	154,420	19,867	117,119	+59,015	+70,577
Commercial Mut., F. & M. N. Y.	6,804,271	314,698		846,792	+118,299	+189,624
Connecticut, Hartford.						+363
Continental, N. Y.	175,543,160	1,511,568	100,810	2,205,416	+1,400,896 ^f	+89,326 ^h
Corn Exchange, N. Y.	9,806,281	81,484		116,943	+6,752	+17,165
Delaware Mut. Safety, F. & M., Philada.	34,357,781	769,078	76,017	767,558	+299,211	+327,677
Eastern, F. & M., Bangor	1,397,775	206,610		127,572	*	+2,714
Equitable, F. & M., Pro- vidence.	9,359,091	140,815	19,858	99,820	+24,922	+51,461
Exchange, N. Y.	4,296,191 ^b	171,545		78,230	*	+19,541
Fairfield County, S'th. Norwalk, Conn.	5,342,721	63,605		41,955	*	+10,150
Fame, Philada.	4,560,878	63,244		89,720	—29,271	—18,479 ^k
Fireman's, N. Y.	20,541,995	215,786	20,400	236,724	+49,559	+14,144
Franklin, Philada.	140,457,955	1,395,885	98,812	1,445,233	+1,031,842	+432,485
German, Erie, Pa.	1,790,723	46,023	15,000	85,623	*	+3,967
Germania, N. Y.	92,449,488 ^b	857,737	50,000	934,602	+204,517	+84,726
Glenn's Falls, Gl'n'n's F.	65,445,434	268,159	10,000	269,294	*	+63,853
Gt. Western, M., N. Y.	26,778,960	1,298,041	197,262	1,362,676	+376,121	+401,024
Guardian, N. Y.	8,852,584 ^b	113,084	20,000	134,745	+30,150	+8,193
Hanover, N. Y.	72,824,085 ^b	955,990 ^j	34,000	819,284	+3,734	+41,573
Hartford, Hartford.	150,000,900	2,114,149	200,620	2,975,019	+510,059	+12,191
Hoffman, N. Y.	10,304,458	133,474	50	121,170	*	+28,836
Home, N. Y.	294,852,308	4,532,361 ^j	249,890	4,075,450	+564,751	+107,500
Home, Columbus.	52,336,428	866,240	47,127	682,076	+16,487	+11,245
Hope, N. Y.	7,717,497	86,736	15,000	100,121	+34,279	+22,111
Humboldt, N. Y.	22,665,611	170,952	20,000	117,485	*	+33,390
Ins. Co of N. America, F. & M., Philada.	149,450,216	2,579,137	98,000	2,624,347	+1,279,750	+993,966
International, N. Y.	67,435,169	871,371	51,282	1,282,594	+357,884	+22,095
Mercantile, N. Y.	11,214,050	163,198	22,000	162,856	+35,208	+8,810
Mercantile Mutual, M., N. Y.	9,845,756	1,206,899	61,574	1,108,487	+122,147	+158,828
Merchants, N. Y.	32,594,454	199,301	20,000	165,406	+141,664	+169,387
Merchants, F. & M., Providence.	18,648,392	211,589	16,000	223,162	+49,243	+56,111
Narragansett F. & M., Providence.	22,303,082	478,943	15,000	464,158	—13,558	—7,015

Massachusetts Companies—Continued.

Company.	Amount at Risk.	Cash Income in 1871.	Dividends paid in 1871.	Cash Exp. in 1871, incl. Div.	Surplus(+) or Deficiency(—) Dec. 31, 1870.	Surplus(+) or Deficiency(—) Dec. 31, 1871.
National, Bangor.....	\$267,919	265,299	\$12,808	204,806	+9,160	—15,031
National, Hartford, I..	1,569,505			7,459		+4,917
National, N. Y.....	22,181,657	185,628	24,000	128,864	+58,850	+87,888
Newport, F. & M., Pro- vidence, M.....	1,369,126	24,974		1,688		+10,288
Niagara, N. Y.....	21,752,018 ^b	743,071	35,788	787,748	+20,598	—95,909
Orient Mut., M., N. Y.	19,485,252	1,051,048		988,254	+121,619	+120,001
Pennsylvania, Philada.	37,378,394	291,952	59,505	163,854	*	+369,893
Phoenix, Brooklyn, N. Y.	82,025,427 ^b	1,423,017	120,000	1,480,758	+372,947	+171,875
Phoenix, Hartford....	123,670,169	1,655,111	150,000	2,076,573	+371,816	+82,038
Relief, N. Y.....	17,719,170	168,588	22,000	145,481	+49,560	+27,094
Republic, N. Y.....	39,331,068 ^b	532,289	15,000	632,143	+135,650	—31,986
Standard, N. Y.....	21,362,128	187,117	21,000	120,896	+105,240	+162,324
Star, N. Y.....	21,848,289	207,145	20,000	142,348	*	+62,136
St. Nicholas, N. Y....	14,178,860	120,507	15,000	108,165	+29,545	+34,962
Sun, Cleveland.....	12,988,447	291,200 ^j	20,500	302,488	+31,759	+2,214
Tradesmen's, N. Y....	25,367,974 ^b	202,518	20,731	199,020	+161,294	+172,697
Triumph, F. M. & I., Cinn. o.....	12,803,321	182,471		77,648		+64,029
Union, F. & M., Bangor	17,129,952	344,893	18,564	230,567	+55,905	+78,658
Union Mutual, F. & M., Philada.....	6,629,840	142,358		145,156	+32,667	+2,322
Washington, N. Y....	433,081	293		11		+605
Watertown, Watertw'n N. Y.....	21,656,100	158,620	20,000	96,795	*	+64,465
Westchester, New Ro- chelle.....	40,269,095	347,434	20,553	291,990	+107,176	+116,063
Williamsburg City, Brooklyn.....	30,484,881	298,887	24,875	306,080	*	+145,573

—“MUTUAL life insurance without dividends” is the motto which the National Life Insurance Company of New York inscribes upon its banner as it advances to the work of 1872. Such a declaration is sufficiently novel and startling to win attention to the ideas and system which it heralds, and being provocative of discussion is likely to evoke the criticism and investigation which the company courts. The words we have cited introduce the National's contribution to the present enlarging circuit of life insurance practice; its expedient for removing inequalities in returns to the insured.

Necessarily in life insurance the early dead draw the prizes. This is designedly and rightly so; and the National's proposition is, consistently with the preëminent policy rights of the dead, to average the benefits between living and dead by withholding

^a Including inland business.

^b Including marine and inland business.

^c Including collected assessments on stockholders to pay Chicago losses and \$33,000 borrowed.

^d Including collected assessments on stockholders to pay Chicago losses.

^e Including premiums on United States bonds and bank stock sold, \$23,778.12, and collected assessments on stockholders to pay Chicago losses, \$100,600.

^f Commenced business December 1, 1871. Admitted to State December 17, 1871.

^g Commenced business October 12, 1871. Admitted January 1, 1872.

^h This company reduced its capital December 30, 1871, from \$300,000 to \$200,000.

ⁱ Including collected assessments on stockholders to pay Chicago losses.

^j Not including the company's percentage on \$12,000 reinsured by the Enterprise Insurance Company of Philadelphia.

^k Commenced business December, 1871. Admitted to State January 15, 1872.

^l Commenced business November 6, 1871. Admitted to State January 12, 1872.

^m Admitted to Massachusetts January 6, 1872. Commenced business October, 1871.

ⁿ Admitted to Massachusetts in 1871.

^o Admitted to Massachusetts in 1872.

† Exclusive of scrip.

amounts assignable as dividends until the consummation of the policy—the policy being consummated according to net premium earnings—not the theoretical net premium, but the net reached by the company's actual experience. This idea is carried out by the issue of an ordinary life policy at the usual premium, which gradually matures, and at the end of a contingent period of years is converted into, or rather is paid as an endowment. Practically, it is the purchase of an endowment at the ordinary life rate, and might be designated as Investment Life Insurance, though the company gives it the more technical title of Contingent Endowment. It unites the superiority of the ordinary life policy, as a simple provision against death, with the financial superiority of the endowment.

In this plan the company does not attempt to prophesy the future, does not build upon any series of assumptions as realized certainties; but it will do the best it can by and for its policyholders in the circumstances of coming years. The managers rationally anticipate that they can clear four per cent. per annum after paying losses and expenses; and with such anticipation as a starting point the company's tables show, as a fair probability, policies paid to living holders at periods less than the life expectation. For example:—Age 30, annual premium \$22.70, \$1,000 paid to insured in less than 26 years, life expectation 35 years; age 40, annual premium \$31.20, \$1,000 paid to insured in less than 21 years, life expectation 28 years. Thus the insured at 30, who lives out and pays out his policy, receives life insurance and four per cent. compound interest on all his money. Under the greater mortality of the older ages the percentage of interest is less, but it has the same equity, and in event of death before earned termination of policy the investment result transcends all questions of rate of interest: the death, after ten annual payments, of one insured at 40 makes the policy worth 142 per cent. more than the sum of all the annual payments compounded at six per cent. per annum.

Single premium, or one full payment at once for \$1,000, age 30, \$359.10; age 40, \$445.60.

Whatever may be interest earnings of capital in coming years, the advantages of the insured will be accordingly. The higher the rate of interest realized, the quicker the realization of the sum named in the policy. As to a remote contingency, which has been a matter of much bitter comment, we will remark that there can be no loss to a policyholder, after paying years of annual premium, through dispute as to the conditions of the risk. By the terms of the National's policy, after five annual payments the contract is *absolutely* incontestable—then “the company waives all right to contest the payment of the policy for any cause whatever, unless it can be conclusively shown that the insured was murdered for the sake of the policy.”

—NEW YORK paid \$3,158,596.30 of fire premium in the last six months of 1871 to the city and agency companies. The largest receipt was by the Liverpool and London and Globe. With one exception, the L. L. & G. wrote in the United States upon a greater aggregate of risk in 1871 than any other company, and paid in the country \$4,361,000 for losses; total payment in the United States for the year, \$5,122,000.

—THE aggregates of life companies doing business in New York in 1871 show a further annual increase of proportions of loss to income; still the showing in this respect is better than might have been anticipated. The annual percentage of loss to income in the last seven years is as follows:—

	<i>Income.</i>	<i>Losses.</i>	<i>Percentage of loss to income.</i>
1865	\$24,897,019 24	\$4,206,019 52	16.87
1866	40,475,665 80	6,283,018 05	15.53
1867	56,481,996 61	7,975,375 79	14.11
1868	77,382,158 02	10,812,043 09	13.97
1869	98,507,818 80	15,226,805 18	15.45
1870	104,242,546 62	19,023,796 12	18.23
1871	112,644,382 00	21,964,381 00	19.49

—THE North Missouri Insurance Company still advances: coming east, it is beginning on the Atlantic side the business extension which has marked its western career. This office has shown a gradual and systematic growth which is noteworthy. Starting at Macon in 1867 with a small cash capital to do business in its immediate vicinity, it established itself so well in public confidence that it became a successful competitor against the wild cats at the time infesting Missouri insurance. Then entering rich agricultural districts, it secured a good line of risks there, and the coöperation of many substantial citizens. Gradually it came up to the larger towns and cities of Missouri, and opening a branch office in St. Louis became as high in favor in the metropolis as in the rural districts. Of its present capital \$75,000 have been paid in by St. Louis, and its body of shareholders comprise capitalists of forty-two counties of the State. Being placed on a good basis in its own State, it sought in other commonwealths—readily complying with the laws thereof—that breadth of operation which is the best and most secure prosperity of a fire insurance company; and though it had a share in the great western conflagrations of last year, including Chicago, yet it closed the year with a liberal profit, and a reputation greatly enhanced by reason of the prompt discharge of its obligations. Its financial conditions at the beginning of last and the present year contrast as follows:—

	January 1, 1871.	January 1, 1872.
Cash capital.....	\$184,050 58	\$200,000 00
Stock notes.....	185,549 42	800,000 00
Accumulated assets.....	20,704 70	145,417 91
	<hr/> \$290,304 70	<hr/> \$645,417 91

We understand that from the arrangements there will be continuous accessions to the cash capital. The officers give the assurance that the as yet unpaid stock subscriptions are largely secured negotiable notes having less than a year to run.

Total reinsurance and other liabilities, January 1, \$114,457.08, leaving net assets for the security of policyholders of \$530,954.83, and the capital guarded from impairment by a net earned surplus of \$30,960.31. Cash income 1870, \$57,069.02; cash income 1871, \$162,526.38—a 185 per cent. gain for the year—and its Missouri business was greater last year than that of any other company doing business in the State.

This company has complied with the laws and been admitted to do business in the following States: Illinois, Iowa, Wisconsin, Ohio, Michigan, Indiana, Nebraska, Arkansas, Kansas, Pennsylvania, New Jersey, and Texas, and is preparing the necessary statements preparatory to applying for admission into New York, Massachusetts, and other New England States.

We give the following detailed statement of assets and liabilities:—

<i>Assets.</i>		
Cash in bank.....	\$26,839 91	
Cash in hands of agents.....	46,301 92	
	<hr/>	\$73,141 83
Bonds (market value).....		87,870 00
Loans on deeds of trust.....		185,175 67
Call loans.....		25,038 58
Interest due and accrued.....		3,186 78
Bills receivable (secured).....		36,885 05
Real estate (company's office, etc.).....		28,000 00
Due from other companies for reinsurance on losses already paid..		2,000 00
Office furniture and personal property.....		4,125 00
Stock notes (secured).....		800,000 00
		<hr/> \$645,417 91
<i>Liabilities.</i>		
Losses in process of adjustment.....		\$15,511 80
All other claims.....		2,099 93
Necessary to reinsure all outstanding risks.....		96,846 35
		<hr/> \$114,458 08

—THE legislative sub-committee conducting the inquiry into the New York insurance department administration, resumed the taking of testimony March 1. Our previous resumé of the proceedings broke off at the point where the actual payment (for examination) made by the West Chester Fire was under inquiry. Prior to adjournment in February, the following testimony was elicited:—

Mr. Wm. H. Bowne, treasurer of the West Chester Fire Insurance Company, New Rochelle, N. Y., testified: "Our company was examined during May, 1871, by Mr. T. R. B. Eldridge; I was with him two days; think he was there four days; we paid \$500 for this examination. The president, Mr. Geo. J. Penfield, asked me to bring him a check for \$500 to the order of Geo. W. Miller; this check was as follows:—

West Chester
County Fire
Insurance Co.

New Rochelle, May 21, 1871.
Fulton National Bank, New York, pay to the order of Geo. W. Miller five hundred dollars.
\$500.

GEO. J. PENFIELD,
President.

WM. H. BOWNE,
Treasurer.

The check is endorsed by Geo. W. Miller and Geo. J. Penfield, 'for deposit to credit of J. G. Brownell & Bro., National Mechanics' Banking Association, New York.' The examination was made at our request, in consequence of certain newspaper stories detrimental to our company; the check was charged on the books as 'fees paid for examination.' "

Mr. Miller: "I beg leave here to state that this endorsement of mine on the check is a forgery, which I shall be able to prove by a thousand witnesses, if necessary. Mr. Eldridge will swear that he never received but \$300 for that examination; I never saw or heard of the check until now."

Mr. T. R. B. Eldridge, one of the commissioners of examination under Superintendent Miller, said: "I was employed in the examination of the West Chester Fire Insurance Company in May, 1871; I received \$300 for the same in three one-hundred dollar bills. [Check shown.] This is not Mr. Miller's endorsement; the writing is too good; I did not write it, and I never saw that check before; I think I was occupied at New Rochelle four days, and here three days; the report was very long; it is on file; I did not make out any bill to the company; I mentioned the charge; it was for expenses; this money I did not give to Mr. Miller, although I have paid him back money which he advanced me for expenses; my expenses on this occasion were about \$100; I was an employé of the insurance department at the time."

The committee sitting again March 1.

Geo. J. Penfield, president of the West Chester Fire Insurance Company, sworn: "Our company has been examined by Mr. Eldridge; the examination lasted six or seven days, and we paid \$500 for it to Mr. Eldridge; the sum to be paid was mentioned by me; was told that they made no regular charge, but that they generally got about \$100 per day; I asked if \$500 would do, and that amount was agreed upon; we did not begrudge the amount for a certificate; did not think the charge extravagant; would have been willing to pay it out of my own pocket for the sake of obtaining the report."

Cross-examined by Mr. Miller: "The investigation was very thorough, and the report was accurate; came to the Fifth avenue hotel for the certificate with Mr. Eldridge and Mr. Crawford; met Mr. Eldridge at the Sturtevant house; there was nothing said there about pay; Mr. Eldridge simply said that it would be necessary to see Mr. Miller; when Mr. Eldridge returned to me with the certificate, I asked him what were his fees; he replied that he left it with the companies, but he usually received \$100 a day; after consulting with Mr. Crawford, I offered \$500, which Mr. Eldridge said was satisfactory; I told him I would leave it at our New York office, and then left with Mr. Crawford; did not suppose the money was to go to Mr. Miller; had the check made payable to Mr. Miller's order, so that the company might have a proper voucher."

The testimony of George R. Crawford, secretary of the West Chester Fire Insurance Company, corroborated that of Mr. Penfield.

THE HOME, OF NEW HAVEN.

Cornelius H. Bushnell: 'Reside at New Haven; was president of the Home Fire Insur-

sance Company; it was examined while I was in office; the capital stock was reduced about that time from \$1,000,000 to \$500,000; was elected president in July, 1870; the company failed during the following winter and went into the hands of a receiver; during the time I was in office our losses each month were about \$75,000 more than our income. [Letter from Miller to the company shown to witness.] At the time the letter was written the company did not have money enough to pay its debts; think the receiver will be able to pay from fifteen to twenty-five cents on a dollar; do not think the company had a dollar capital after the Portland fire, January, 1867; the communication from Mr. Miller was not used in the sale of stock; the company was doing an immense business; their twelve hundred agents were sending in large sums of money, and they owned three-quarters of a million dollars' worth of the best property in the city; but their liabilities were still greater; the examination was made by Mr. Southwick and Mr. Miller in September, and occupied about a day and a half; the failure occurred in December; Mr. Miller told us to go on and struggle through, if possible; paid Mr. Miller a check for \$250; Scranton & Co. are bankers in New Haven, occupying rooms in the same building with the Home Company; they were in the habit of cashing checks drawn by the officers of the Home." [The statement of the receiver was shown to witness, and declared by him to be correct.]

To Mr. Miller: "If the representations made to me at the time I took hold of the company had been true I could have carried it through; the statement made by Mr. Miller and Mr. Southwick, in September, was the result of a careful examination of the books of the company; I believed it to be true at the time, but afterwards found losses and risks which did not appear on the books."

After a debate between Mr. Barnes and Mr. Miller, Charles Wilson, secretary of the Home, of New Haven, was placed on the stand, and examined by Mr. Barnes. He said he had been connected with the Home Fire Insurance Company from its organization until July, 1870—a period of twelve years; the examination of the company's affairs was made by Mr. Miller in June, 1870, and occupied a day or two; he knew nothing of the process of the examination, or who was present at it; the capital was reduced from \$1,000,000 to \$500,000; the counsel of the company was T. E. Doolittle; Mr. Pierce came to the office on one occasion, but only remained a few minutes; he did not remember an entry in the book of \$5,000 being paid to Sewell & Pierce as a retainer; there were several checks made out to E. S. Scranton & Co., and he identified one which he had drawn for \$5,000 to their order; he did not know the object of the check, and had no reason to suppose it was paid to Sewell & Pierce. Mr. Wilson explained how he came to visit New York to give his testimony. He had received a note from Mr. Hope, who inclosed the slip cut from the paper; on Sunday, while in church, Mr. English had asked him what he knew about the matter, and although he declined giving any information on the subject at that time and place, he was willing to give it then; he had been almost threatened with further publications if he did not give Mr. English the information; when he came to New York he had no idea of coming before the committee.

In answer to Mr. Miller, he said he was not aware that Mr. English had said the Home Fire Insurance Company had never had more than \$400,000 of capital; if he had said so, it was false; the cash capital was \$850,000, and the remaining \$150,000 was made up of stock dividends; they were at the time they so stated in actual possession of \$1,000,000 of capital; the reduction of capital to \$500,000 left that amount unimpaired. The witness knew nothing of the affairs of the company after he left, except that their losses far exceeded their receipts during the time from June to December, 1870.

S. E. Marvin, Jr., receiver of the Home Fire Insurance Company of New Haven was called by Mr. Barnes. He testified that his assignment as receiver was made on January 9, 1871, and the appointment was confirmed late in the month; three-fourths of the real estate had been sold; the liabilities, aside of the capital, will amount to \$300,000; this is exclusive of those secured by special deposits, which amount to \$150,000; the expenses for settlement will add from \$25,000 to \$50,000 more to the liabilities; the assets, beyond the special deposits, will not exceed \$150,000, and it is expected that, if there is no long litigation, a dividend of fifteen per cent. may be declared; he had found an entry under date of June 14, 1870, as follows:—

"By expenses, Sewell & Pierce, retainer and services.....\$5,000."

The witness knew nothing about the payment of this money, or what it was paid for; the premium receipts from July 12 to December, 1870, were \$361,726, and the losses, \$598,495; the losses on the new premiums were but \$80,000; if the company had stopped in July there would not have been sufficient to pay the liabilities without including the capital; did not know the value of the stock prior to Mr. Miller's first examination of the condition

of the company, but after the reduction of the capital the shares were sold at all prices; just before the failure they were sold as low as \$1 for 50 shares.

In answer to Mr. Miller, the witness said he had been a stockholder of the company for some time, and was elected a director on July 13, 1870; about the same time he was elected vice-president; although holding these offices, he had no greater pecuniary interest in the company than before; when elected vice-president, he believed the company to be in a better condition than he afterwards found it; he remembered Mr. Miller being in the company's office with Mr. Bushnell during September, 1870; there was a great amount of figuring, and it was stated that the capital was impaired; he had no reason to believe the superintendent had been purposely imposed upon, and the statement was drawn up from the books as they stood; revelations were afterwards made which could not have been ascertained from the books; the exact condition of the company was not found out until December; the witness had hoped to carry the company through, but the loss had been upon the old and not new business; it would have been impossible to have found out the condition of the company by any examination of the books.

FURTHER ABOUT THE COMMONWEALTH CHECK.

George T. Haws, late president of the Commonwealth Fire Insurance Company from November, 1866, to the time when it went into the hands of a receiver, testified that he recollected a check being drawn for \$1,000, and believed it was paid John Fowler, Jr., for past professional services; he had no knowledge of the erasures in the stub check book or in the cash book, and only saw them a few days after the company had been in the hands of the receiver; he had never seen Mr. Miller until the second examination, in March, 1871, and had never paid him a dollar in any way, either directly or through counsel; the examination was made by Mr. Southwick, as he supposed, under the direction of Mr. Miller, and Mr. Southwick was paid \$300 for his services.

THAT \$500 ITEM.

David Rowland, in reply to Mr. Tobey, testified that he had no arrangement with Mr. Miller or any other person in relation to the \$500 mentioned in the statement produced by Henry A. Jones, and the suggestion had been purely his own; but when Mr. Jones objected to the appropriation, it was stricken out; the money was never given to Mr. Miller.

THE MILLER LIFE BILL.

Theodore R. Wetmore, vice-president of the Security Life Insurance Company, said a subscription list to procure the passage of the Miller Life bill had been presented to him last spring; the sum required was \$20,000; his company was asked for \$1,500, and this he paid; other companies were down for amounts ranging from \$3,500 to \$2,500. The witness understood that the companies were in favor of the bill, and had paid the amounts they were put down for; since then he had thought he had been imposed on, and that the other companies had paid nothing; he knew nothing of the way the money was to be used.

George F. Sniffen, secretary of the Knickerbocker Life Insurance Company, testified that he saw a list given in the testimony of Mr. Wetmore, in which the Knickerbocker Company was put down for \$3,000 towards the Miller Life bill, but had no recollection of any such sum being paid for that purpose; about that time a check was given to Mr. Johnson for \$3,000, but he understood it was for legal expenses; he was positive that no check was given to Lawrence or Goodsell, and had no reason to suppose that the check to Mr. Johnson was for any other purpose than legal expenses; there is no entry of any such amount paid to any person between December, 1870, and May, 1871, under the head of taxes or otherwise.

Charles E. Pease, secretary of the United States Life Insurance Company, said that he countersigned all checks paid out, and from February 13, 1871, when he first entered on the duties of his office, no check for \$2,500 had been given for any such purpose; he had no knowledge of any check being given for such a purpose, and he could find no such check indicating such a payment; he recollected signing a check for \$3,500, payable to the order of Charles E. Bell, vice-president of the Bank of New York and chairman of the finance committee of the United States Life Insurance Company; he could not find the check, and could not say how it was used, as it was not stated on the stub; several checks are charged on the stub check book to legal expenses, as several counsel are employed; there is no record of a check paid to J. H. Goodsell for such an amount.

John M. Stuart, secretary of the Mutual Life Insurance Company, produced a copy from the stub check book on the Bank of New York, showing the following entry:—

"No. 11,856.—Paid G. W. Miller, Albany, for sundry expenses in passing laws, \$3,500, March 14, 1871."

The witness said he could produce the check; he presumed it was charged to the tax account; he knew nothing of the special object for which the check was drawn; he knew nothing nor had he any recollection of any payment being made to the attorney-general, deputy-attorney-general, or Lyman W. Briggs; he knew nothing of the check except from the stub, and as that was in his handwriting, he supposed he drew it; he had no knowledge of the check being connected with the examination of 1870.

Richard A. McCurdy, vice-president of the Mutual Life Insurance Company, testified that the check had been drawn by the order of the president, Mr. Winston, and understood, somewhat imperfectly, that it was to be used towards securing the passage of some bill before the legislature; he knew nothing about a list to raise \$20,000; Mr. Winston and James H. Goodsell entered the witness' room on the day in question, and were talking for a time about some measure that was before the legislature, after which Mr. Winston assented to the payment of \$3,500; the check was made payable to the order of Mr. Miller, as Mr. Winston was not well enough acquainted with Mr. Goodsell; Mr. Winston thought the bill was a good one, and forwarded the check to Mr. Miller, inclosed in a letter.

"MUTUAL LIFE INSURANCE CO. OF NEW YORK, 144 and 146 Broadway,

"New York, March 14, 1871.

"George W. Miller, Esq., superintendent:—

"Dear sir—We send our check for three thousand five hundred dollars, to be expended in such legitimate and proper way as your judgment may direct.

"Very respectfully and truly yours, F. S. WINSTON, President."

James H. Goodsell, publisher of the *Spectator*, an insurance paper, was called by Mr. Miller. Witness was aware of the measures brought before the legislature last winter relative to insurance matters; there were thirty-five or forty bills introduced, some to injure insurance business, others to advance the interests of policyholders; about twenty bills were introduced into the Assembly, six or seven of which were reported by the insurance committee and printed; six of the bills might be classed as obnoxious bills, being both injurious to the companies and to the policyholders or other customers; one bill was introduced as the Amended Life, Health, and Casualty act, which was a codification of all the existing life laws; this bill was introduced after a consultation with officers of life insurance companies; the witness had been employed by a number of the leading companies to represent them in Albany and elsewhere, for the purpose of urging the enactment of good bills, and opposing those that were obnoxious; not one of the obnoxious ones was enacted; six bills were printed, but the others were smothered in committee; the life bill was passed in the Senate, but was defeated in the House, late in the session; it never reached a consideration by the committee of the whole, as persistent efforts were made to prevent it; witness went to Albany early in the session, ascertained what bills had been presented, and obtained copies where practicable; having examined the bills thoroughly, witness came to New York; saw Mr. Winston, and informed him that it would be necessary to take proper and legitimate measures to secure the passage of such as were good; Mr. Winston agreed with the witness, and employed him to represent his office at Albany, fixing the price as his compensation, which he agreed to send to Albany to the care of Mr. Miller; Mr. Winston asked if witness had called upon him by the advice or request of Mr. Miller, and was informed that Miller knew nothing of his calling or the object; a check for \$3,500 was therefore sent to Albany, it being understood between Mr. Winston and the witness that Mr. Miller knew nothing of it; the morning following the application to Mr. Winston, witness called at the insurance department, expecting a letter, but on inquiry found none had been received; while there, Mr. Miller called witness into his private office, and knowing that he (Goodsell) represented the Mutual Life Insurance Company, told him that he had received from Mr. Winston a check for \$3,500, which he thought it was his duty to send back; witness explained that the check was for him, whereupon Mr. Miller said he did not like to be made the medium of the transmission of money between insurance companies and their representatives in Albany; not being known in Albany, witness requested Mr. Miller to cash the check, which was done by the latter handing witness the money, and passing the check to his own account; Mr. Miller never received from witness one dollar for services or favors rendered, nor gave witness one dollar for any service connected with the insurance department.

In reply to Mr. Tobey, the witness said he had known Mr. Miller about seventeen months, and had first made his acquaintance in Albany, at the insurance department; the witness had been absent from the city during a part of the time the investigation had been going on, and had only been twice in his office in the Underwriters' building; he repre-

sented several insurance companies in Albany during the sessions of the legislature, having been employed by them for that purpose.

Q. Was the sum of \$20,000 paid to you to secure the passage of the bill? A. I decline to answer.

Q. Was any portion of the money paid to other parties than Miller? A. I decline to answer the whole question, but some was; not a cent of it was paid directly or indirectly to Mr. Miller; I will answer any questions as far as relate to Mr. Miller, but as relate to others and my private affairs I decline to answer.

To Mr. Barnes: I was employed and paid money to represent insurance companies, but beyond the matter relating to Mr. Miller I decline to say from what companies; the money I received from the Mutual Life was for my compensation during the session; so it was understood.

Q. Did you receive money from the Equitable Life? A. As I said before, I decline to answer; the Anchor Life employed me to represent them at Albany, but I decline to answer how much was paid; it was paid to me some time after the certificate of examination was furnished by Miller.

THE ANCHOR LIFE INSURANCE CO.

E. B. Colt: "I am vice-president of Anchor Life, of New Jersey; E. C. Fisher is the president; we were examined in March last; it lasted twelve full days; don't know who made the examination, nor the amount paid; there is no charge entered on the books for any such examination; there are no checks to Briggs, Southwick, or Southworth, or Sewell & Pierce; there is no entry to indicate any payment, although I was informed that \$500 were paid."

James H. Goodsell said he knew Joseph B. Ecclesine, the editor of an insurance paper, and Edmond C. Fisher, the president of the Anchor Life Insurance Company; had heard from Fisher of the examination of that company; had never represented to Fisher that he must use money with Miller to obtain a favorable examination; had conversed with Fisher, who appeared doubtful as to the character of the certificate he would obtain; Fisher was particularly anxious to get a good certificate, and wanted to know if witness could help him; witness told Fisher that he possessed no influence with Miller, but if the company was sound, he (witness) was willing to present the facts to the superintendent or any one else interested; witness warned Fisher not to attempt to improperly influence the superintendent, either directly or indirectly; had never received any money to be used for such a purpose, nor intimated to Fisher that any other person could use money for such a purpose; do not know of any money having been paid to the superintendent by any person for the purpose of securing a certificate, or influencing any other official action.

To Mr. Barnes: Witness did not represent to the officers of the Anchor Life Insurance Company that he was connected with the insurance department; there was no sum of \$1,500, or any other sum, given him for the use of his influence with Mr. Miller; witness received money from the company for printing and advertising; money was paid witness for services at Albany; that money was received after the company had been examined and had obtained their certificate; had received no other money from the company at any time, directly or indirectly; did not know who examined the company's affairs, or what was paid for doing so.

The sub-committee adjourning at New York, the full committee resumed the investigation at Albany March 23.

E. C. Fisher, president of the Anchor Life Insurance Company of New Jersey, sworn and testified: "Our company was examined in February, 1871; Southwick and Carr made the examination; it took from ten to twelve days; I paid Southwick \$500 for that examination; told him it was a large charge, but paid it nevertheless; drew a check and cashed it myself; James H. Goodsell, publisher of the Spectator, called on me to know if I had any certificate; I told him I had not; he said he hoped I would hurry up, as he wanted to put it in the Spectator; I told him I could not get it sooner than Miller would give it; he said perhaps he could get it, and asked how much I would give for it; I said I would be willing to pay \$1,500 for it, as I was left in a very bad fix; I was lying idle, unable to do anything until I got the certificate; he accepted my proposition, and I gave him a check for \$1,500. [Witness here exhibited checks, together with check-books and stubs to checks.] That was all I paid; this \$1,500 was paid to get the certificate of the report."

Question by Mr. Tebey: "For what reason did you pay this money to Goodsell?"

Mr. Miller did not see the pertinency of the question. If we are to go into reasons for acts, we can get no end to evidence of that character. Witness answered that his reason for paying this amount was that his business was at a standstill, and Goodsell assured him

he could get the report; "I paid the money after the report was handed to me by Southwick; I had not made any special effort to get the report; Goodsell told me at the time that I must not suppose a dollar was to go to Miller; it was to pay for trouble he [Goodsell] would be to; do not know but I could get the report at a less price; I did not think it was actually necessary to pay this sum to Goodsell; I paid the money out of my own pocket, and the financial committee of the company has not yet approved of the transaction; I knew Goodsell and Miller were on intimate terms; Mr. Goodsell asked me to subscribe to a fund to carry forward what was known as the Miller Life Insurance bill before the legislature last year; I declined, as mine was a foreign company; the superintendent of the insurance department can injure a company by detaining a report after examination is made; such delay stops business."

Witness was cross-examined by Mr. Miller: "Received only one certificate; endeavored to get another more favorable certificate; sent our counsel, who was a personal friend of yours, to get another; you stated to me that circumstances rendered it doubtful whether you would give us a certificate; you also afterwards told me you could not give me another and better certificate; I have no knowledge of you ever receiving any of that money; the examination ultimately resulted in good to our company; you never approached me in any manner concerning the matter."

The examination showed that there were second mortgages offered, and witness explained that they were abundantly secured.

Witness continued: "I told Mr. Goodsell I would not pay a cent to the department for a certificate; I paid the money only for the examiner's services."

Witness' examination here closed.

Mr. Miller then read the certificate he had granted, and also one written by Mr. Fisher, and sought to be obtained, but which was not granted. The latter endorsed the honesty, as well as the ability of the management of the company. Mr. Miller said, in conclusion, that no \$1,500 procured such a certificate from the insurance department while in his charge.

THE NEW YORK TIMES.

Testimony on the part of the prosecution closed March 5th. Mr. Miller began his defence on the 6th by calling to the stand two of the conductors of the New York Times, to elicit the writers of articles in that paper against the present administration of the insurance department. The examination and cross-examination of George Jones and J. L. Jennings continued during the day. They refused to yield the information sought after. One or two brief selections from this division of the case will be sufficient for illustration.

Mr. Miller, reading a portion of the editorial article headed "Superintendent Miller's sins of omission," asked Mr. Jones who wrote the article. Mr. Jones declined to answer. He then asked whether Mr. Barnes wrote the article, and received the same answer.

Mr. Miller then showed the witness an article published in the Times of January 13, 1871, headed "Another life insurance bubble," and another of January 9, both of which, he said, spoke favorably of his course with regard to the Great Western Insurance Company, and asked if he remembered them. Mr. Jones said it was impossible to remember all the articles published in the paper; the articles seemed to approve of his course. Two other articles of a similar character were shown to the witness.

Mr. Miller: Were you aware of these articles when the policy of the paper was changed with regard to me? Mr. Jones said he doubtless was aware of them. To the inquiry whether or not Mr. Stephen English was engaged on the Times, the witness replied that he did not choose to answer any question as to who was or was not on the Times staff, or in the office; he did not know Mr. English by sight, and had had no conversation with him, to his knowledge, on this or any other subject.

Mr. Miller said he only desired to show Mr. Jones that he had been imposed upon.

Mr. Barnes said that was the way Mr. Miller avoided the issue before the committee. He only wanted to show that Mr. Jones had been imposed upon. This had no pertinency with the question; nor had the motives which had instituted the investigation. The subject was—are the charges against the insurance department true or false? As to the motives, and as to their purity, that can be left to the calm judgment of insurance companies when relieved from the duress under which they are now laboring, and to that of the people of this great State.

An article headed "Miller's perquisites," published in the Times on December 28, 1871, was then shown the witness by Mr. Miller, who asked if Mr. Barnes was the author, or had procured its insertion in the paper. Mr. Jones declined answering both questions.

Mr. Miller to Mr. Jennings: Were not the attacks on me based on representations of

some parties that I was a Tammany Democrat? A. Not at all, sir; you mean have we attacked you on account of your political opinions?

Q. No; but were not the attacks instigated in part by intelligence that I was a Tammany democrat? A. Not at all.

Q. Was such information communicated to you? A. That charge has been repeatedly made against you in the paper, but that wasn't the ground of the attack on you as an insurance officer; that may have been an incidental part of our remarks upon you; it was not the occasion of them.

Q. Did you believe I was part of that organization? A. I always did believe you had a great deal to do with it.

Q. What led you to think so? A. Public rumor and public facts.

Q. Your paper represented that insurance officers were making complaints against me. A. Yes.

Q. [Produces an article "What the companies say of Miller's administration."] You recognize that? A. That is what is called a news article.

Q. [Reads: "One president of an insurance company stated 'we are under a despotism and tyranny, etc.'"] Now, seventy-five officers have been examined here, and we could get none of them to swear that; can you give us the name of that officer? A. No; I wish they would come forward, and I must say it is a great pity they do not.

Q. Will you give the name of the writer? A. No; I think it is my duty to decline; but he was a member of our staff who has no prejudice against you any more than I have; I must say my inclination is exceedingly strong to give you some information as to the men who gave us information, and now refuse to come forward.

Q. But you are bound by your relations to the paper not to give these names. A. Certainly.

Augustus St. Clair testified that, as a reporter of the Times, he had been employed to hunt up evidence in regard to the charges made against Mr. Miller; that he had had interviews with a great number of insurance presidents and officers, who concurred in the views that they had no complaint against Mr. Miller; from Messrs. Winston and De Wit he had obtained answers to certain written questions furnished him by the Times; these answers he had supplied, but they were not published; subsequently he was ordered to see Thurlow Weed; he obtained an interview with him, and was referred to Mrs. Barnes; witness, while travelling over the New York Central road, stopped at Utica and other cities, and made inquiries concerning Miller; at Rochester the superintendent of police, with whom he was acquainted, informed him that Miller owned real estate worth \$30,000 in the city; while at Rochester, he met Pember, of the Times, who supplied the information in regard to alleged judgments recorded against Miller; witness inquired into that matter and found that several of the judgments in question were against a man named Miller who was not the superintendent of insurance; at Elmira he met Gen. Diven, who told him that he knew Mr. Miller and his family, and that they were reputed to be wealthy; witness was in Albany the week before last; Mr. Jones, of the Times, was also there at the time; with Mr. Jones's consent he waited on Mrs. Barnes, who told him that at a party given in Rochester, Mrs. Miller had worn a diamond necklace worth \$20,000; Mrs. Barnes also stated that she had been informed by Speaker Smith, of the Assembly, that once, when purchasing jewelry in New York, he had been invited to examine a bracelet which was about to be presented to Mrs. Miller, and which was worth \$4,000; Mrs. Barnes told him that the relations between Mr. Barnes and Mr. Miller had been friendly until the latter had refused to sell Mr. Barnes the insurance library; witness told Mr. Jones what Mrs. Barnes had said, and Mr. Jones told him to "pipe and pump," and hunt up all the facts; accordingly on his return to New York he visited the leading jewelry stores; from the proprietors he could obtain no information, but from a clerk at Ball, Black & Co.'s he ascertained that some jewelry answering the description had been bought there for his wife by George S. Miller, the "Tammany court-house carpenter." Witness knew Stephen English, of the Insurance Times; English intimated to him that it would be worth something to "get up a howl" in the press against Mr. Miller; from all witness could learn from insurance officers, there was no foundation whatever for the charges contained in the articles written by English to the Times.

Frank W. Ballard testified that he had written articles for the New York Times in reference to Miller's official conduct; he believed the articles were true at the time he wrote them, but he had since come to a different conclusion, and for the change in his opinion had not received any inducement from Miller; he wrote the articles himself, and offered them to the Times, and he was paid for them by check in the name of F. W. Browning.

Charles M. Goodsell, one of the proprietors of the Spectator, testified that Ballard had been on his paper about two years, under a salary, and he [witness] was not aware that he was writing for another paper, in opposition to the policy of the Spectator; witness had cause recently to suspect that Ballard wrote the articles from the style of the language; when the supicion became confirmed, witness intimated that Ballard ought to go forward and acknowledge his error.

The evidence taken in New York was then, March 16th, closed, and the sub-committee adjourned to meet with the full committee at Albany.

We note the following payments for company examinations additional to the list given in our March issue, viz.: Citizen's Fire, \$250; Mercantile Fire, \$230; Amicable Mutual Life, \$200; Mercantile Mutual Marine, \$1,300.

—THE annual pamphlet report of the Life Association of America is comprehensive, explicit, and up to the technical requirements. The issue of 1872 is a document of much interest. From the report of W. Hanley, Esq., actuary, contained therein, to President Britton, we make the following extract:—

The net assets on the 31st of December amounted to \$3,613,153.50, distributed as follows:—

I. Amount of loans secured by deeds of trust or mortgages upon real estate according to the laws of the States where such loans are made.....	\$1,352,884 81	
II. Amount of loans secured by pledge of bonds and other collaterals....	160,691 76	
III. Premium loans and notes taken in payment of premiums and liens on policies now in force.....	1,192,844 44	
IV. Cash value of United States and State bonds owned by the Association.....	144,213 75	
V. Cash in home and department offices and in banks.....	165,069 37	
VI. Interest accrued on cash loans and bonds owned by the Association..	45,000 00	
VII. Gross amount of premiums in process of collection and transmission on policies in force December 31, 1871..	\$495,259 23	
Amount deducted to reduce this item to the net values charged against the policies on account of those premiums.....	86,274 16	
Net amount.....		408,985 07
VIII. Gross amount of deferred premiums.....	159,572 66	
Amount deducted to reduce this item to the net values charged against the policies on account of those premiums.....	27,787 86	
Net amount.....		131,784 80
IX. Office furniture and safes (about 40 per cent. of cost).....		11,679 50
Total net assets.....		\$3,613,153 50

The gross liabilities were \$3,246,516.05, composed of the following items:—

I. Claims for death losses in process of adjustment and adjusted and not due.....	\$57,000 00	
II. Claims for death losses, payment resisted (see attorney's report)....	10,000 00	
III. Dividends held in trust and accrued liabilities.....	18,795 98	
IV. Reserve, or net present value of all the outstanding policies of the association on the 31st of December, 1871 (Am. Ex. 4½ per cent.).....	\$3,195,528 54	
Deduct net value of reinsurance in other companies held by the Association.....	34,898 47	
Net reserve.....		3,160,720 07
Total liabilities.....		\$3,246,516 05

Leaving a surplus, or excess of assets over all liabilities, of \$366,637.45.

You will observe that the foregoing schedule of assets differs in its classification from that of the reports which I had the honor to present in 1870 and 1871, caused, as you are aware, by the necessity of conforming to the requirements set up in the uniform blank for

reports of insurance companies, adopted by the National Convention of Insurance Superintendents in New York. The only radical difference in the assets, as made by the blank before referred to, is in items VII and VIII, where you will see the result of the deduction "to reduce these items" (outstanding and deferred premiums) "to the net values charged against the policies," etc., is substantially to chop off the loading or margin added to net premium, instead of, as heretofore, to make a simple deduction for the probable actual cost of placing the moneys in the hands of the company. This latter is manifestly the just and correct plan, as well as the most consistent in its results. Especially is this the case when we consider that the rule has to be applied to two classes of companies, strictly mutual or mixed companies with mutual rates, and proprietary companies with stock rates.

I will take, by way of illustration, a mutual company, the loading on whose rates averages 20 per cent., and a stock company, whose loading averages 5 per cent. Suppose each of these companies has on its books "premiums in course of collection and transmission and deferred premiums" aggregating \$500,000. Under the old requirements of departments, they would probably report these items with a deduction for actual cost of collection of about \$50,000, leaving the net amount of \$450,000 to be admitted in each case.

On the uniform blank they would appear as follows:—

MUTUAL COMPANY.	STOCK COMPANY.
Premiums in course of collection and transmission and deferred premiums..... \$500,000 Amount deducted to reduce this item to the net value charged against the policies, etc. 100,000 <hr/> \$400,000	Premiums in course of collection and transmission and deferred premiums..... \$500,000 Amount deducted to reduce this item to the net value charged against the policies, etc. 25,000 <hr/> \$475,000

Here the stock company is made to appear, by an arbitrary rule, to have \$75,000 more assets than the mutual company, and is in fact placed in a better position than if it had collected and in its possession the entire \$500,000, less the agents' commissions, in just the amount that those commissions would exceed five per cent.

But though this and other inconsistencies are observable in the "uniform blank," yet it may be considered as a great improvement on the old system; and it is to be hoped that the convention will meet again, after its members will have gained more experience and seen the practical workings of the system which they have set on foot, with a view to its improvement.

It is a matter of congratulation to the members of the Association that its condition enables it to comply with the most rigid requirements of the laws of the various States in which it does business, and have still on hand a very handsome surplus.

Before making any disposition of the surplus now on hand, I would most respectfully recommend the careful consideration of a suggestion made at a recent meeting of the executive committee, by the Hon. Wm. Barnes, as to the propriety of laying aside this year, from the surplus on hand, a certain sum, as a nucleus around which to gather an extraordinary reserve, for the purpose of providing against any possible adverse contingencies which may arise in the future.

My opinion is, that \$200,000 of this surplus should now be placed in the fund before referred to, to be called the Safety Reserve fund.

Of course, the dividends, which can be paid under the disposition of the surplus above suggested, would necessarily be moderate; yet I have no hesitation in making the recommendation, believing, as I do, that safety is the first consideration, compared with which the amount of dividends paid by the Association in its earlier years is of little consequence.

The death losses during the year have been considerably less than is provided for by the table of mortality, under which the Association's premium tables are based.

—LIKE chess, the different combinations of compound interest, with variations in periodicity, would seem to be inexhaustible. Such differences lie at the bases of the various new life plans now put forth. The New York Life Insurance Company issues a Tontine investment policy which affords various opportunities to the insured as he shall elect. The company gives the following estimate of results under different circumstances, viz.:—

ORDINARY LIFE POLICY, AGE 40, \$10,000. ANNUAL PREMIUM, \$813.

First Benefit.

Tontine period, 10 years, annuity for life combined with dividend,	\$227.90.
“ 15 “ “ “ “ “ “	546.30.
“ 20 “ “ “ “ “ “	1,160 10.

Thus at the end of 15 years' period the annuity will pay the premium and leave a surplus for increasing income.

Second Benefit.—To withdraw the accumulated profits in cash.

Tontine period, 10 years, 56 per cent. of premiums paid returned.	
“ 15 “ 101 “ “ “ “	
“ 20 “ 150 “ “ “ “	

Third Benefit.—Surrender of policy to the company.

Tontine period, 10 years, 107 per cent. of premiums returned.	
“ 15 “ 154 “ “ “ “	
“ 20 “ 207 “ “ “ “	

Fourth Benefit.—Paid-up policy.

Tontine period, 10 years, \$7,500.00.	
“ 15 “ 15,000.00.	
“ 20 “ 23,500.00.	

Fifth Benefit.—Surrender of policy and purchase of annuity for life.

Tontine period, 10 years, \$286.20.	
“ 15 “ 699.50.	
“ 20 “ 1,450.00.	

—THE Republic Life of Chicago issued 3,765 new policies in 1871—certainly a great work for a company organized so late as September 9, 1870; and the time has not only been brief, but the period inauspicious. Such result has been attained at an unusually small ratio of expense for a young company. Total of realized assets more than doubled in the year. Mr. L. D. Cortright has been elected second vice-president; Mr. John F. Collina, late of the Anchor Life, secretary and manager of agencies. In Geo. W. P. Bowman, Esq., vice-president and manager of the New York branch, the Republic has a representative well up to the duties of his position—a gentleman of tact and decided executive force.

—BY its seventh annual report, the Globe Mutual Life Insurance Company of New York shows the continuance of the solid acquisitions of former years. With receipts for 1871 of \$1,848,642.48, there was an addition of \$838,894.15 to the assets, and \$629,355.26 were returned to policyholders. Total assets January 1, 1872, \$3,213,185.28, all of which, less a small percentage, are actual interest-bearing investments. The asset position of the Globe has always been of the highest standard. Its interest receipts for 1871 exhibit for the average of the year's total assets—for every dollar of the account—6.4 per cent. earnings. This makes the Globe's surplus over liabilities and capital a reality, and not a mere margin of flimsy padding to an asset column. Policies issued last year, 2,895, insuring \$7,238,495.

—THE investigation into the management of the New York insurance department has, as we write, not yet closed, and we report, in our abstract of the proceedings, the progress of the trial. No event of equal moment or such wide-spread influence has before occurred in American insurance experience; and whether the result is to be good or evil, depends upon the intelligence and impartiality with which the subject is grasped in all its bearings. We see, however, on the part of those who should maintain a calm, unbiassed watchfulness over the developments, the zeal of partizanship, and the substitution of opinions, favorings, prejudices, interests, and antagonisms for facts. A State officer is now under examination through a State commission of inquiry. Properly, as the press may have spoken as to the necessity of such inquiry, the tribunal being instituted and the accused summoned, newspaper critics are not to be the judges or jurors in the case, nor yet to conduct the prosecution or the defence. Within the insurance circle just now there is wanted that true independence which at the proper time can afford to acquit or condemn whoever may suffer or whoever may be advantaged. Besides Mr. Miller directly, and Mr. Barnes indirectly, a good many persons and subjects are virtually on trial, and their trial is not likely to close when judgment is pronounced upon the administration of the New York insurance department. There will be sifting which will disclose the ground and opportunity of abuses, and may determine in how far legislative interference in the business of insurance has fostered corruption, and be a check in the future against the over-legislation which burdens the interest and impedes its progress.

—THANKS to Messrs. T. & J. Slator, of the New York and Real Estate Journal, for their excellent tabulation of the statistics of the life companies doing business in New York in 1871. The sheet reflects credit upon the enterprise and industrious research of the compilers. From the advance pages of the Massachusetts report for the year—fire and marine insurance—we have extracted with confidence for our present issue. Promptness is among the merits of Commissioner Clarke, whose ability and stern integrity still command respect for American State insurance supervision. We acknowledge the courtesy of a broad chart from the New York department, Hon. Geo. W. Miller, superintendent. The two ample tables cover the business and position of the fire and fire-marine companies authorized to underwrite in the State in 1871. This is a new feature of the department, and praiseworthy as filling an hiatus existing in former years.

—UNITED STATES Supreme Court.—Union Mutual Life Insurance Company of Maine vs. Wilkinson. Error to the Circuit Court for Iowa. Suit on a policy of insurance taken by Wilkinson, a resident of Iowa, on the life of his wife. The defence was that the wife had incipient consumption when the insurance was obtained, which fact was fraudulently suppressed, and that she had been years before seriously injured by falling from a tree, which fact was also fraudulently suppressed. The two questions were submitted to the jury, and they found for the insured in both instances. The cause was brought to the Supreme court on a writ of error to the judgment, and this court affirms the judgment, finding no error in the ruling of the court below. Mr. Justice Miller delivered the opinion.

—TWENTY-ONE New Orleans fire insurance companies have combined and obtained a charter from the Louisiana legislature to transact an agency business under the title of the New Orleans Underwriters' Agency, with authority to write \$100,000 on a single risk. The new association will commence business in New York, and establish agencies throughout the northern and western States.

—A BILL has passed the Ohio Senate to compel life insurance companies of other States doing business in Ohio, to file a waiver of the right to transfer any case from the State to United States courts.

—THERE is a report that the Mississippi Valley Life Insurance Company transfers its risks to the St. Louis Mutual Life.

—NEW JERSEY proposes to "retaliate" from a new basis. Supplements to the present law begin with the orthodox formula "That when by the laws of any other State or nation," etc., etc., etc.; then "provides" in the case of fire companies that the "tax of two per centum on all premiums" shall not be repealed. New Jersey has, however, made the discovery that life insurance is not fire insurance, and simply continues for the life business the present fifty-dollar license fee, with twenty-dollar annual payment for each and every agent acting for a company.

—At a meeting of the Chicago Board of Underwriters, March 14, Mr. Chadwick tendered his resignation as representative of the underwriters in the board of police and fire commissioners, the underwriters previously voting that such resignation was desirable. On motion of Capt. Ryan, Mr. L. H. Davis was elected fire commissioner for one year.

—ABOUT fifty fire insurance projects are in various inchoate stages throughout the country. Possibly ten per cent. of them will culminate in something respectable. The result to be feared, however, from the existing demand for more insurance "capital"—heaven save the mark!—is the infliction of a batch of fresh frauds upon the public.

—THOS. W. BLAYNEY'S insurance agency, Chicago, is one of the oldest in that city. The State, of Hannibal, is the latest addition to the list of companies. Mr. Blayney's experience in the business will be of advantage to the State. The International, of New York, and Eastern, of Bangor, are also represented by this agency.

—ALLIGER BROTHERS, New York, add Mr. G. W. Shoonmaker to their firm. Mr. S. has been bookkeeper and cashier of this successful insurance agency since its start. This firm represents four and three-quarter millions of assets, and is qualified for the broadest and most extended operations.

—THE Insurance Company of North America of Philadelphia, Royal, of England, Springfield Fire and Marine, People's and National, of Massachusetts, are the companies represented in Chicago by Messrs. Charles H. Case & Co. Good underwriters, careful and judicious business men.

—IN the good work of reducing expenses of management, the Mutual Life and the Knickerbocker Life stand first among New York life companies. For the first-named office, the percentage of income to expenses in 1871 was 7.1 per cent.; for the Knickerbocker, 11.2 per cent.

—TOTAL assets of the life insurance companies of Hartford, on the 1st of January, \$71,747,100. Number of policies in force, 187,494, insuring \$432,919,053. The Phoenix Mutual Life is now at the head of all the Hartford life offices in respect to amount of new annual business.

—THE National Fire Insurance Company of Boston has been refused certificate of authority to do business in Connecticut.

—A BILL has passed both houses of the legislature of Pennsylvania, and approved by the governor, authorizing the Mutual Life Insurance Co. of New York to hold and convey real estate in the cities of Pittsburgh and Philadelphia, of a value not above two million dollars.

—OWING to its small extent, the Amicable Life had a business last year which took for death claims and expenses over 11 per cent. of amount at risk; the Hercules Life over 9 per cent. For the general business of the country the percentage is about 2½.

—MR. I. J. LEWIS, of Chicago, is reported as one of the very best marine underwriters of Chicago, and is also meritorious as a fire underwriter. He is agent for the Triumph, Detroit Fire and Marine, and marine department of the Andes.

—MR. L. E. ROEDER, an intelligent, active, and respected citizen of Newark, N. J., engages in the life business. Mr. Roeder is of the style which is wanted. He takes the agency of the Knickerbocker Life for Newark and vicinity.

—THE International Fire Insurance Company of New York, represented in Philadelphia by Sherrerd & Co., has been transferred to Etting & Co. The Standard, of New York, goes from Sherrerd & Co. to Prevost & Herring.

—JAMES M. RANKIN, late of the Fulton Fire, and Joseph L. Lord, associate as the firm of Rankin & Lord, in the city agency of the Lancashire Insurance Co. of Manchester, England, now beginning business in New York.

—THE North Missouri Fire Insurance Company having organized a Lake and Western department, has placed the company's Chicago agents, Messrs. H. S. Tiffany & Co., at the head of the department.

—T. E. DANIELS & EVERETT have been appointed agents of the North Missouri Insurance Company for Detroit. This addition makes the agency of Messrs. D. & E. one of the strongest in Detroit.

—PREMIUM on coal breakers advanced from 3¼ to 4 per cent. by the agency companies in Pennsylvania, on account of liability to disturbances and incendiarism among the miners.

—AMONG the leading life insurance agencies in Chicago is that of Samuel Green, successor to Banker Bros. & Green. Mr. Green represents the old United States Life, of New York.

—BUFFALO did not compete with other cities in 1871 in the matter of building pyrotechny. Buffalo, which lost \$1,092,431 in 1866 by fire, was content with \$99,942.75 in 1871.

—THE old Pennsylvania Fire, Philadelphia, declared a dividend March 4th of 7¼ per cent. on the par of the stock out the profits of the previous half year.

—MR. J. W. CUNNINGHAM supersedes A. Newton Locke as secretary of the Glen's Falls Insurance Company.

—JUDGE T. ORMSBEE is manager of the new Central department of the State Fire, of Hannibal, Mo.

—SALES in New York of Relief Fire stock at 96 per cent. of par value; Corn Exchange, 92¼.

RAILWAYS AND TRANSPORTATION.

THE great event of the past month among railroad men has been the change in masters of the Erie railroad. Everyone seems aware that strenuous exertions have been made by the English stockholders, aided by a portion of the Americans who had cause to be dissatisfied with the management of that road, to effect a change; but with such secrecy had the coalition been formed, and their plans matured, that the public were taken by surprise at the sudden action. On the 8th ultimo nine of the directors—among whom was O. H. P. Archer, the vice-president—addressed a letter to President Gould, requesting him to convene the board on the 11th ultimo “for the consideration of such business as may be deemed necessary.” The directors signing this letter—with the exception of Mr. Archer, who is reported to have been secretly elected to his position, vice Fisk, resigned about a week before the death of the latter—had been identified with the management of the road for years, but took occasion to say in the letter above referred to, that they had “witnessed with deep regret the growing distress which pervades the community in regard to the management of the company, and especially its finances.” No attention was paid by the president to this letter, although the call seems to have been in accordance with the by-laws; and on the next day the same directors, with the exception of Mr. Archer, addressed a similar letter to the vice-president, stating that they had been unable to communicate with President Gould; and Mr. Archer, in response to this letter, issued a call for the meeting accordingly. The meeting took place, eleven out of the fourteen available directors being present, and also one hundred policemen as spectators. Mr. Gould did not recognize the meeting as legal, and was not present in the flesh; but shortly after the organization of the meeting there appeared also about one hundred roughs, who claimed to have been appointed special policemen by him.

The meeting organized with the vice-president in the chair, but was very shortly served with an injunction against further proceedings, issued by Judge Ingraham, of the supreme court. This injunction the board disregarded, and proceeded, seemingly in accordance with a previously arranged plan, to accept the resignations of various members of the board, and immediately to elect new members in their places; and when the directory was reorganized, a resolution was adopted removing Gould from the office of president, and then immediately electing Gen. Dix president in his place. Gould refused to recognize the validity of the new movement, and various demonstrations were made during the night and the day following, and at one time the prospect was good of a fight between the regular and special policemen; but late on Tuesday, Gould seeing that a majority of the directors were opposed to him, and that they had the power to do in a legal manner what he claimed they had done illegally, compromised the matter. The meeting was again held, with him presiding; the performance of having certain directors resign, and electing new ones was again gone through with, and when accomplished, Gould presented his resignation.

The winning party are, of course, much elated over their success, and the public generally seem to expect much from the new board. The means made use of to oust Gould

are sanctioned by the circumstances, but when repeated on other roads will not be quite so popular: besides, a majority of the new board have a larger interest in the Atlantic and Great Western than in the Erie, and while everyone admits the high standing of most if not all of them, still the prosperity of the Erie road would be much better advanced by a board whose interests are wholly with that corporation.

—CONSIDERABLE interest has been manifested in railroad circles about the late retirement of the representatives of the Pennsylvania railroad from the directory of the Union Pacific Railroad Company, which event took place at the annual election on the 6th ult., the more from the fact that the new directors are unquestionably "Vanderbilt men," and probably will hereafter control the management as Mr. Scott has heretofore.

Whatever may be the true reason of the change—and many different ones are confidently put forward, each claiming to be the true one—it can hardly have been from dissatisfaction on the part of the stockholders with the management of the road by its late officers; for the year just closed is, if the price of stock is any criterion of prosperity, the most prosperous of any in the annals of this road—the increase in price during the year being quite 50 per cent. Nor, it would seem, could there have been any dissatisfaction with the means employed to bring about this result, since it seems to have been accomplished by nothing more pernicious than strict economy, the remarkable feature being a reduction of the running expenses from 71 per cent. of the gross receipts the year before to 48 per cent. during the year just past; thus effecting a saving of more than \$2,000,000, and this, too, with receipts of the road about \$100,000 less than the previous year. It is very probable that the late officers did not care for reelection; at least they made no sign, and there was but one ticket voted for. They are supposed to be interested in the early completion of both the Northern and Southern Pacific lines, especially the former, and it makes but little difference who runs the Central line as regards the Pennsylvania railroad, nor will it do so in future. The Railroad Gazette, in discussing this question, thinks that the Central Pacific, by controlling, as it does, the California roads, has it in its power to seriously injure both the Northern and Southern roads, but admits that the future of the Central Pacific is not assured, from its lack of way traffic. From some of these conclusions we dissent. The ownership of the California railroads cannot prevent at least a fair share of the through traffic from being landed at Puget sound, a place much nearer China or Japan than San Francisco; and when so landed, it, of course, will be shipped eastward over the nearest route—i. e., the Northern Pacific.

Indeed, we notice a bill introduced at this time in congress for the purpose of incorporating The Asiatic Commercial Company, with a capital of \$5,000,000, for the purpose of trading to China and Japan, and that the late president of the Central Pacific, Mr. Scott, is to be a member of the proposed corporation. No subsidies are asked for, and the bill will probably pass, and under energetic management will exercise a powerful influence over the whole Asiatic trade, and can divert much of it from San Francisco if desirable. The Northern Pacific, too, will undoubtedly have a valuable way traffic; so much, indeed, from the States and territories through which it passes, and the adjacent British possessions, that the traffic from California will not be essential to the success of the road.

—It is reported that the Chesapeake and Ohio railroad, which is pushed rapidly to completion, proposes to tunnel that part of Richmond known as Church Hill, the object of which is to locate the end of the road on the bank of the James river, at a place where there is sufficient depth of water to float a large steamer. This is certainly the right movement; and although the proposed tunnel will be quite long and very expensive, it will be found true economy to build it. The terminus of every trunk line should be as near to the dock of the ocean steamer as possible, and the ideal of cheap transportation will not be reached until merchandise can be transferred in large quantities direct from the railroad car to the hold of the steamer. Some months ago a writer took the position

that Philadelphia should purchase a thousand acres or so on the bank of the Delaware as a convenience for storing and shifting cars, and for the location of a mammoth union depot. Even if the city should purchase the ground and present it to the railroad companies, we think the increase of business, &c., would make it a good investment; but it is by no means probable that this would be required.

The question of traversing large cities by railroads is already looming up, and may as well be grappled before it becomes unmanageable; and the only solution practicable seems the one now under advisement in Chicago, and perhaps other places—viz.: An avenue excavated below grade, wide enough to accommodate all the railroads, and in such a case the railroad park suggested would also seem necessary and proper. In this connection, and with the fact before us that it costs two dollars per ton for lighterage, &c., to transfer cargoes from the steamers in San Francisco to the cars, the efforts of the Central Pacific railroad to obtain the whole or a part of Goat island for a depot is proper and right, and we think the plan proposed—i. e., for commissioners to examine the subject and report to congress what portion of the island can be leased to the railroad company without impairing its value as a defensive position, (which is very important to be kept intact,) and how much the company shall pay for the privilege—is the proper one under the circumstances.

The San Francisco board of trade doubtless expressed the views of a large majority of the inhabitants of that city when they protested, but so did the mobs in Erie some years ago when they resisted the railroad companies who proposed to join their tracks.

—We are in receipt of the third annual report of the board of railroad commissioners of Massachusetts, and from the very superficial examination we give it, it seems a valuable and complete document. The commissioners take occasion to re-recommend the passage of a general railroad law, or rather code, and the repeal of the multifarious acts now on the statute books; from which we infer that Massachusetts is in the same situation in this respect as the rest of the Union. The construction of railroads during the year (September 30, 1870, to September 30, 1871,) has been more than usually active in Massachusetts, 180,000 miles having been put in operation—there being at the close of the year 1,605,772 miles of railroad in active use, or about one mile of road to each 4,140 square miles of territory, and to every 907 inhabitants. The commission especially recommend the repeal or modification of the law of 1871, which in its practical operation “limited the return of new capital invested in the leading lines of the State, not at ten per cent., but at ten dollars per annum on the market value of the stock of such companies, thus reducing the return on new capital from ten to eight, and even seven per cent. Less inducement is thus held out to private capital to seek investment in the railroad system of Massachusetts than in any State in the Union.”

The report has the usual number of tabulated statements, from which we gather the following: Amount of capital stock of Massachusetts railroads, \$55,582,590.54; debt, \$17,651,766.05; cost and equipment, \$69,244,080.95; gross income, \$27,185,975.11; expenses of operating, \$19,475,179.56; interest paid, \$1,188,099.15; dividends paid, \$5,619,699.86; from which it is inferred, although we have not the means at hand for making comparisons from official documents, that the railroad interests of Massachusetts as a whole will compare favorably in point of prosperity with those of most of the States of the Union.

—STILL another railroad enterprise for connecting the East and West is reported. The line in question is the Canadian Southern railway, which, commencing at the International bridge, runs west to St. Thomas; thence south-west to Amherstburg, near the mouth of the Detroit river. A branch line will also be built from St. Thomas due west to St. Clair, on the St. Clair river. The length of the main line from Buffalo to Amherstburg is 239 miles, and of the branch from the same place to St. Clair is 184 miles. Its eastern connections will be by the New York Central, Erie, and Buffalo and Washington, the latter road forming connection with the Pennsylvania railroad, thus opening a new

route to Philadelphia, Baltimore, and Washington. The western connections to Chicago will be by the Chicago and Canadian Southern line from opposite Amherstburg, and by the Peninsular and Midland, and Michigan Airline railways from opposite St. Clair. The distance by this route from Buffalo to Chicago is said to be thirty-three miles shorter than by the Great Western and Michigan Central; forty-five miles shorter than by the Lake Shore Airline, and fifty-five miles less than by the old line of the Michigan Southern. The maximum grade of the Canadian Southern and Chicago and Canada Southern (which is to form the main line from Buffalo to Chicago) is reported to be less than fifteen feet per mile. Both these roads are under contract to be constructed complete this year, and are to be furnished with steel rails. Prominent railroad men are understood to be engaged in the enterprise and vigorously pushing it to completion.

—FROM the annual report of President Cameron, of the operations of the Northern Central railway for the year 1871, given to the stockholders at their annual meeting at Baltimore on the 22d of February last, we condense the following:—

Total earnings for the year.....	\$4,266,898 85
“ expenses “ “	2,989,737 85
Net revenue.....	\$1,277,161 00

Increase of earnings over previous year, $4\frac{1}{2}$ per cent.; increase of operating expenses over previous year, $1\frac{3}{8}$ per cent., accounted for mainly from the system of charging many items of permanent improvement to the operating expenses, such as steel rails in place of iron, iron or stone bridges in place of wood, &c. The operations of the leased lines have been satisfactory, the Shamokin division having increased largely in trade and profit. The increase in receipts has been mainly from freights, of which an increased quantity was moved at a slight decrease in price per ton. The increase in the transportation of coal was 96,974 tons.

—WE present the following summary of the Union Pacific Railway's annual report for the year ending January 31, 1872: Total earnings, \$7,521,682.16; expenses, \$3,600,566.86, being $47\frac{1}{10}$ per cent. of the earnings, leaving net earnings for the year \$3,921,115.80—being a decrease of expenditures of 28 per cent., and an increase of net earnings of 33 per cent. as compared with the preceding year. The decrease in gross receipts is accounted for by the severe winter causing detention of trains. The bridge at Omaha has been completed, and will soon be open for the passage of trains. The operations of the land department have been very satisfactory: the number of acres sold between March 1 and December 31, 1871, was 192,275 $\frac{1}{10}$ acres at the average price of \$3.81 per acre. Up to the close of 1871 there have been sold 500,000 in all, yielding an average price of \$4.20 $\frac{2}{10}$ per acre.

—FRANK J. FIRTH, Esq., auditor of the Empire Transportation Company, has been elected vice-president of the Erie and Western Transportation Company, and Joseph T. Wilson, Esq., has been appointed auditor of the E. & W. line. As financial manager of the Empire line Mr. Firth has shown very high qualifications: he is a thorough adept in all the details of the transportation interest. Mr. Wilson has been connected for some time with the auditor's department of the Empire line, where his ability has been tested and proved; and his appointment as auditor of the Erie and Western is a deserved recognition of his merits.

—THE proposed tunnel under Mt. St. Gothard will be nearly twice as long as that under Mt. Cenis, and will pass under peaks varying from 8,000 to nearly 11,000 feet in height. Goods can be shipped from Yokohama to Liverpool in 43 days; the time by the English steamers, through the Suez canal, being 73 days.

PATENTS, ARTS, AND SCIENCE.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Del.]

THE value of expert evidence in courts has been recently assailed by a portion of the newspaper press; and opinions have been freely given that, from the unreliability of some of the testimony in cases involving questions of science, the whole system of employing professional witnesses is defective. This hasty conclusion has been formed in consideration of the fact that, in some important cases which have been tried within the past few months, a notable weakness has been detected in the evidence of certain of the experts who have been examined. A striking example of this incompetency was manifested in the Wharton trial in Baltimore, where the chemical witnesses for the prosecution went into court wholly unprepared to substantiate the opinions they had formed, and entirely unable to withstand the rigorous cross-examination of the counsel for the defence. In all the annals of recent toxicological investigations it would be difficult to cite an instance where professional labors were so emphatically thrown away. The tests upon which the experts rested their case were, to say the least of them, extremely equivocal, and entirely lacked that degree of positiveness so desirable in scientific testimony of any character, and so absolutely necessary where the life of a human being is at stake. So weak was the evidence, as a whole, that it was brushed away like a tissue of cobwebs before the far more thorough, exact, and positive character of the testimony of the experts called for the defence.

In civil cases—especially in suits involving questions of the law of patents and trademarks—a similar negligence or incompetency is sometimes observed on the parts of professional experts; and in cases of all descriptions—whether chemical, geological, or mechanical—the most incongruous and conflicting opinions are often submitted as evidence, the jury being more perplexed by the disagreement of the expert testimony than by the principles involved in the litigation.

A remarkable disagreement of opinion was recently observed in New York in a trademark suit, relating to the manufacture of mustard. Dr. Doremus, whose chief claims to eminence consist in the fact that he is a scientific lecturer of some reputation, was retained as an expert, and in his evidence swore that mustard-seeds contain upwards of eleven per cent. of starch. Professors Chandler and Seeley, the able witnesses for the opposite side, contradicted this assertion, when Dr. Doremus proceeded to convince them—as well as the court and jury—that he was right, by bruising some of the seed in a mortar, boiling in distilled water, and dipping slips of paper in the solution, upon which he produced the characteristic blue color of starch, by the well-known iodine test. This reaction was exhibited to the jury with an air of triumph; but on Prof. Chandler quietly intimating to the court that the paper itself would show the reaction without being treated with the solution, the effect of the experiment with its sustaining opinion was immediately annihilated.

But errors such as these reflect on the individual and show his weak points, and do not necessarily invalidate the principle of expert evidence. On the contrary, they go to show that if men of science themselves may be mistaken, how much more so may be the jury, composed, perhaps, of persons wholly unacquainted with the subjects under discussion. So long as contestants in legal suits do not know how to discriminate in favor of thoroughly trained working scientists—men perhaps without the showy brilliancy of those who may be very superficial, and yet who, even while wearing an air of superiority, are often “flunked” in their examination—just so long may we expect to find the expert system laid open to criticism, and subjected to abuse. In favor of this system there are many arguments. Indeed, in the present state of our patent laws regulating the ownership of discoveries or inventions, there are questions constantly arising which can only be satisfactorily settled through the medium of expert evidence. If these witnesses be selected solely from men thoroughly educated to their respective professions, and likewise gifted with a sound practical common-sense, which is quite as indispensable, we would hear less clamor than has been recently raised, and there would be less partizanship than is sometimes observed in the manner of furnishing testimony. This subject is assuming an increased importance every succeeding year, and bids fair to occupy a share of public attention far greater than has hitherto attached to it.

—In a recent number of the *Journal de l'Eclairage au Gaz* mention is made of one of those accidents which are liable to attend the use of copper gas pipes, caused by the formation of an explosive compound, pronounced by some chemists to be the acetylide of copper. In the accident in question a workman was engaged in cutting a gas pipe of copper with a file, when an explosion ensued, making a noise similar to the report of a rifle, and severely burning the operator. In the early days of gas-lighting, when copper gas pipes were much more commonly used than now, these accidents were not unusual; and as they were sometimes attended with fatal results, it became a matter of interest to ascertain the character of the explosive and the reason of its formation. As long ago as 1839 a workman was employed in removing some gas fixtures from a house in New York, where they had been in use for several years, and in order to remove an obstruction which had partially clogged one of the copper pipes, he put one end of it in his mouth and forced his breath through it. A loud explosion immediately took place, lacerating the mouth and fauces of the artisan so severely that he died in a few hours. A few pieces of these pipes were examined by Dr. Torrey. One of them was securely fastened in a strong bench vice and the interior gently scratched with a bent wire, when a sharp explosion ensued, and a large volume of black smoke and dust was projected into the air. A small quantity of the explosive material was carefully detached from the pipes and submitted to a number of experiments in order to test its character. A minute portion struck with a hammer on an anvil, detonated sharply, throwing out sparks. Touched with a hot iron at a temperature of 400° Fahrenheit, or even less, it flashed like gunpowder. Some of it fired from a small gun drove a ball through a stout plank, while, when mixed with chlorate of potash, it exploded violently either by heat or friction.

From the results of his investigation Dr. Torrey concluded that the new body was an unstable compound of some hydrocarbon and metallic copper. It consisted of small scales of a dark reddish-brown color, with a decided crystalline structure. Böttger, a few years ago, investigated the nature of this compound, and came to substantially the same conclusion as that entertained by Dr. Torrey, remarking that it was still undetermined which of the hydrocarbons is united with the metal, but that it is of a very remarkable composition, acting like a compound radical, similar to cyanogen. Since then Bertholet has called the substance *cupros-acetyls*, and its composition is no longer a matter of doubt, as is indicated by its name. It may be prepared in the laboratory by passing acetylene through a solution of subchloride of copper in ammonia, when it separates in the form of a red precipitate, which may be washed and dried either in the air or over sulphuric acid. Made in

this way it explodes with great violence, even when gently heated. As acetylene is always present in small quantity in coal gas, the formation of the explosive compound, when copper pipes are used, is readily accounted for. But fortunately, as these are seldom now employed, no apprehensions of mysterious accidents need be entertained by consumers of gas, or by workmen engaged in repairing fittings.

—SILK fabrics are often adulterated by admixture of fine threads of cotton or wool. In view of this fact, a ready method of detecting the imposition is desirable. The microscope is frequently used for this purpose, and with tolerably accurate results; but this instrument is not always at hand. A simple chemical test has been proposed by Spiller, who has used it for some time with success. It consists in the employment of hydrochloric acid, which is an energetic solvent of silk, while it leaves cotton and wool almost intact, even after a lengthened exposure. In experiments with this reagent, samples of so-called pure silk ribbons and other fabrics were immersed in the acid, when the silk was promptly dissolved away, leaving the threads of the adulterating materials uninjured. If a few drops of hydrochloric acid be allowed to fall upon a piece of pure silk, a hole will be eaten into the fabric. If other materials be present, the silk alone will disappear, leaving the other ingredients. This test is simple, and may be easily and quickly applied.

Another process for detecting adulterations of silk has been proposed by Jules Person, which consists in the use of a concentrated solution of the basic chloride of zinc, which quickly dissolves the silk without affecting the other fibres. It is largely used in France, being employed to decide upon the admissibility of certain mixed tissues into commercial ports. The solution is prepared in the following manner: A solution of chloride of zinc is boiled with an excess of oxide of zinc, so as to obtain a completely saturated solution. This is filtered and evaporated to a density of 60° Beaumé. At the boiling-point it possesses the property of dissolving silk in fifty or sixty seconds, and one of its valuable features is, that the same solution may be used a great number of times. It also permits the silk to be detected in a thread or mixed tissue, even in the presence of all the other animal and vegetable fibres. Of these two processes for determining adulterations in silk goods, we should give the latter the preference.

—In a memoir addressed to the Manchester Philosophical Society, Prof. Jevons suggests that the reappearance of Encke's comet in always somewhat shorter periods, may be reconciled with well-known physical laws, instead of assuming that space is pervaded by a resisting medium, which is the view held by astronomers. In place of this theory Prof. Jevons would substitute electric action, on the ground that "if the approach of a comet to the sun causes the development of electricity arising from the comet's motion, a certain resistance is at once accounted for. Wherever there is an electric current some heat would be produced, and sooner or later radiated into space, so that the comet in each revolution will lose a small portion of its energy. The question is thus resolved into one concerning the probability that a comet would experience electric disturbance in approaching the sun. Evidence now exists that there is a close magnetic relation between the sun and planets. If, as is generally believed, the sun-spot periods depend on the motion of the planets, a small portion of the planetary energy must be expended. Is there not, then, a reasonable probability that the light of the aurora represents an almost infinitesimal fraction of the earth's energy, and that in like manner the light of Encke's comet represents a far larger fraction of its energy?"

The theory thus suggested by Prof. Jevons has certainly some show of plausibility, and merits respectful consideration. Its author occupies a high position among the scientific men of England, and has given no little attention to subjects of this nature. The doctrine of a resisting medium, although generally adhered to, has some unbelievers, who would gladly accept any other reasonable theory could it be made to accord with the facts elucidated by the study of celestial phenomena.

—MULLER, a French physician, has recently investigated the physiological relations of meat extracts, which have been so highly lauded by members of the medical profession. His views vary greatly with those who advocate the use of these extracts, and will doubtless lead to some discussion relative to their merits. Muller declares that they cannot be regarded as food either directly or indirectly; because, on the one hand, they do not contain albumenoid substances, while on the other their nitrogenous principles do not arrest the metamorphosis of the tissues. He admits that when taken in small quantities the potash salts which they contain may, by their stimulant action, favor digestion and circulation; but states, at the same time, that when taken in larger amounts they may exert a highly injurious influence; and that when administered after a protracted illness, when exhaustion of the system has followed as a result of continued abstinence, potash salts have a positively deleterious effect, which is the more decided in proportion as the system has lost more common salt. For these reasons he concludes that, so far from favoring nutrition, meat extracts actually impede it—first, by the direct action of the potash salts upon the blood-corpuscles, producing a less absorption of oxygen; and second, by the predominance in the serum of salts which dissolve the carbonic acid only physically, and which, therefore, do not allow the exhalation of the normal quantity of this gas, nor the introduction of the normal quantity of oxygen. Muller concludes by warning physicians that to give these meat extracts as sole articles of diet, is simply to starve the patient.

—“**PLANOTYPE**” is the name of a new kind of wood engraving, which has been described in a foreign scientific journal. The process consists in transferring the design to be engraved to a block of the wood of the lime-tree, which is then placed in a machine somewhat similar in appearance to a wood carving machine, the shape of which varies considerably with the nature of the work to be performed. The graver is heated to redness by means of a gas-jet. By the proper manipulation of this contrivance the design is gradually burnt into the wood, while figures or letters referring to parts of the engraving are impressed by punches. When the design has been completely reproduced on the wood, it serves as a mould for the type metal, which takes the impression on being cast and poured directly on the wooden surface, which is performed in a manner similar to the ordinary stereotype process. It is claimed that the heat of the molten metal does not injure the wood, nor does it even impair the most delicate lines of the design. This process has been applied on a large scale, with results which are said to be highly satisfactory.

—In the report of Col. T. J. Cram on “creasoting” timber, made in response to a request from the office of the chief of engineers, U.S.A., he refers to the knowledge of antiseptics for preserving wood which must have been entertained by the ancient Egyptians. Their old wooden coffins, after two thousand years, have been brought to light; and, according to credible witnesses, they were constructed of sycamore wood, which, when split into pieces, was perfectly sound and strong. The wood seemed to have been impregnated with a bituminous substance which effectually preserved it. The coffins were “dug-outs” from solid blocks of wood, leaving a hole in the top to insert the corpse, and having a lid carved and ingeniously fitted to enclose the aperture. It is well known that sycamore wood untreated is not a very lasting wood, but that it is liable to speedy decay. The process used by the Egyptians is yet one of the lost arts, and whether it may be recovered and resuscitated remains to be seen.

—ACCORDING to Prof. Kennigott, of Zurich, on the 20th of August last a hailstorm occurred, which lasted five minutes, and the stones—some of which weighed twelve grains—consisted essentially of common salt, mainly in imperfect cubical crystals. He accounts for this singular phenomenon by supposing that the salt may have been taken up from the salt plains of Africa and transported over the Mediterranean. Prof. Eversmann, of Kasan, has recently described hailstones, each containing small crystals of iron pyrites, which were probably weathered out of some rocks in the vicinity.

—ALLUDING to the fact that the rays of the sun reveal dust floating in the air, as everyone has observed, Daniel Culverwell quaintly says: "The sun discovers atoms, though they be invisible by candle-light, and makes them dance naked in his beams." The admirable essay of Tyndall on Dust and Disease will be remembered as an exhaustive treatise on a very obscure, and no less important subject. Mr. Charles Stodder, of Boston, a microscopist of extended reputation, has recently examined the fine dust deposited in the polishing shop of the Springfield armory, in which he found a few vegetable fibres, a few apparently organic fragments, and broken crystals. Particles of iron in amorphous fragments and of various dimensions, from one-hundredth of a millimetre upwards, and curved and irregular fibres and masses of iron with sharp and jagged edges formed two-thirds of the quantity. In order to remove the metallic particles from the dust, and to prevent their inhalation by the workmen, Mr. Stodder revives the old expedient of electromagnets to be placed about the grindstones and polishing wheels, so that the iron-dust might be attracted and prevented from being diffused through the air.

—ZETTNOW has recently experimented on processes for obtaining chromic acid, in which he arrives at the conclusion that Traube's method of preparing the acid from bichromate of potash by means of sulphuric acid is superior to that of Kuhlmanow, who prepares it from chromate of baryta. Zettnow suggests that to every 800 grammes of bichromate of potash 375 to 400 cubic centimetres of sulphuric acid of 66° be used, or 665 to 732 grammes—the higher proportions being the better—while 500 cubic centimetres of water are required. To purify the crude chromic acid from all traces of potash, pure nitric acid of 1.45 specific gravity should be used, and this be free from all nitrous and hyponitric acids. This acid dissolves but little chromic acid, while it readily eliminates the potash and sulphuric acid. Chromic acid may be fused in a platinum dish, without disengaging oxygen, and will begin to crystallize at a temperature of about 840° Fahrenheit. As it solidifies, the temperature rises to 878°.

—PROBABLY in no industry has American mechanical skill made more marked progress in the last few years than in the manufacture by machinery of watches. The National Watch Factory at Elgin, Illinois, is a perfect museum of wonderful machinery, which turns out, adjusts, and combines the one hundred and fifty-six parts of the improved, simplified watch, which has succeeded the old eight-hundred-piece hand-made contrivance. As timekeepers the Elgin make meets the severe tests and requirements of the railroad engineer with unusual success, and it has been adopted as the standard by several leading trunk lines. It is reliable even when just from the factory, and a gentleman who has carried one for nearly four months, assures us that the variation in that period is but about forty-five seconds.

—THE improper use of the terms "combustible" and "supporter of combustion," as applied to the description of some of the elementary bodies, has often been pointed out. It is well known that oxygen may be burned in an atmosphere of hydrogen or illuminating gas, which is very neatly shown by taking an ordinary glass chimney, such as is used on kerosene lamps, and fastening it to a holder, and through a perforated cork at the large end introducing a stream of ordinary coal gas. The gas is ignited at the small end of the chimney, and through the opening is introduced the tube conveying a current of oxygen, which takes fire in passing through the flame at the aperture, and continues to burn in the interior of the cylinder, sometimes with the same singing tone as is exhibited by hydrogen.

—It is a fact which is familiar to chemists that a species of *fungi* will form in solutions of citric and tartaric acids, and that this formation is frequently the source of no little annoyance. In the transactions of the Cleveland Literary and Philosophical Society of England, Mr. W. H. Wood states that the development of the *fungi* may be prevented by simply boiling the solutions.

MONETARY.

GREAT diversity has been shown in the aspects of the money centres since our previous note. Influenced by low bank reserves, the stringency of February was augmented in March in the chief cities of the Atlantic coast, with spasmodic signs of relaxation upon the return of currency from the interior, where comparative ease has prevailed. The New York banks present some improvement in their legal surplus, but this has come from decreased deposits, not augmented resources. Heavy treasury disbursements of gold in payment of interest, with millions of bond redemption, have more than met the extra commercial demand of large importations, but without effect on the specie item of the bank statements. Speculators in New York have taken advantage of the situation to withdraw currency from the market, but the general artificiality of the prevailing condition is revealed by the fact that on the same day, in the city of New York, money was dearer at the one hour, and cheaper at another hour, than at any other place in the country. Speculative purchases of securities have been retarded, without, however, depreciating prices beyond ordinary fluctuations, and strong movements in particular stocks have not been repressed to any appreciable extent by the rates of loanable capital. Sales of Erie railroad for foreign account, arising from the change in its management, have been large enough to effect the exchange market, and shipments of bills drawn against Erie transactions have operated against exportation of both specie and products. The stock so long a financial drawback, now comes to the front as a stimulant. With the immediate future rather indefinite, and the bank position unfavorable to a repetition of the ease of last year, there are yet indications that any positive pressure in April has been in a measure, at least, discounted.

—Sales of Stocks, etc., at New York.

	Mar. 4.	Mar. 11.	Mar. 18.	Mar. 25.
U. S. 6's, coupon, 1881.....	115½	115½	115½	115½
“ 5-20's, coupon, 1862.....	111½	111½	112	111½
“ 5-20's, coupon, 1864.....	111½	111½	111½	111½
“ 5-20's, coupon, 1865, m & n.....	112	112½	112½	112½
“ 5-20's, coupon, 1865, j & jy.....	110½	110½	111½	110½
“ 5-20's, coupon, 1867.....	111½	112	112½	112½
“ 5-20's, coupon, 1868.....	112	112½	112½	112½
“ 10-40's, coupon.....	107½	108	108½	108
Pacific 6's, currency.....	114	114½	114½	115
Tennessee 6's.....	67	66½	66½	67½
“ 6's, new.....	67	66½	66½	67½
North Carolina 6's.....	85½	88	88½	87
“ 6's, new.....	19½	18	21	23
Missouri 6's.....	95	95	95	95½
N. Y. Central and Hudson R. con.....	96½	99	95½	94½
Harlem.....	108½	108½	112	111½
Erie.....	82½	86½	48½	60
Lake Shore and Michigan Southern.....	92½	92½	93	94
Wabash.....	75½	75½	75½	77½
Cleveland & Pittsburgh.....	90	90½	91	91½
Northwestern.....	79½	79	78½	82
“ preferred.....	92½	91	92½	94
Rock Island.....	112½	118	118½	114½
Fort Wayne.....	98½	98	98½	97
Milwaukee and St. Paul.....	58	59	59½	63
“ “ preferred.....	78½	79½	79	81
Ohio and Mississippi.....	45½	44½	45½	48
New Jersey Central.....	112	112½	118	112½
Western Union Telegraph.....	70½	70	71	71½
Pacific Mail.....	62½	61	61½	62
Union Pacific.....	86½	86	86½	88
Adams Express.....	98½	94	98	98
Wells, Fargo & Co. Express.....	.....	.....	.....	77½

	Mar. 4.	Mar. 11.	Mar. 18.	Mar. 25.
American Merchants Union Ex.	69½	72½	74	73½
United States Express.	66	70½	74	74
Rate for Money.	7	7@½	6@½	6@7

Sales of Stocks, etc., at Philadelphia.

Gold.	110½	110½	110½	109½
Sterling exchange.	120½	120½	120½	120½
Paris exchange.	4.78	4.78	4.78	4.78
Lehigh Valley Railroad.	68½	68½	*56½	59½
" " 6's.	96	96	96	95
" " 7's, reg.	100½	100½	101	101½
Lehigh Navigation.	89½	89	41½	43½
" " 6's, 1884.	89	89	88	88
" " 6's, g ln.	92½	92½	92½	92½
" " 6's, R.	98	98½	98	98
City 6's, no tax.	100½	100½	100½	101
" tax.	97	97	97	97½
Pennsylvania Railroad.	60½	59½	58½	60½
" " allotments.	58	57½	57	58½
" " 6's, 1m.	100	99½	99	99
" " 6's, 2m.	100	100	100	100
Pennsylvania 6's, w ln.	100	100	100½	100
" " 6's, first ser.	100	100½	100½	100
" " 6's, second ser.	105	105	105	104½
" " 6's, third ser.	108	108	108	107
" " 5's, cp.	108	108	108	107
Reading Railroad.	57½	56.94	56½	57.44
" " 6's, mt.	98	98	98	98
" " 7's.	98	98	98	98
Catawissa Railroad.	16	16	16	16
" " preferred.	46½	46	45½	46½
New York and Middle.	49½	49½	49	50
North Pennsylvania R. R.	49½	49½	49	50
" " 6's, mt.	99½	99½	99	99½
" " 7's, mt.	96½	98	96½	96½
" " 10's, chat.	96½	98	96½	96½
Camden and Amboy R. R.	125½	125½	126	124½
" " 6's, mt, 1889.	96	96	96	96
" " 6's, 1888.	90½	91½	93	91½
" " 6's, 1889.	91½	91½	91	91
West Jersey Railroad 6's.	98½	98½	98	98½
" " 7's.	108	108	108	108½
Philadelphia and Erie.	26½	26½	26½	26½
" " 6's.	89½	89½	89	90½
Allegheny County, 5 cp.	78	78	78	78
Schuylkill Navigation.	8	8	8	8
" " preferred.	16	16½	16	16½
" " 6's, 1882.	79	78½	78½	78½
Morris Canal.	48	48	48	48
" " preferred.	98	98	98	98
" " 6's, 1882.	98	98	98	98
Little Schuylkill Railroad.	46½	46	46	46½
Oil Ck. and Al. R.	89½	86½	86	88
" " 7's.	80	80	80	81
Phila., Ger., and Nor. R. R.	85	85	86½	86½
Minehill Railroad.	52½	52½	52½	53
Elmira and Williamsport, preferred.	52½	52½	52½	53
" " 7's.	61	60	60½	60½
" " 5's.	61	60	60½	60½
Northern Central.	49½	49½	49½	49½
Fulton Coal.	49½	49½	49½	49½
Big Mountain.	49½	49½	49½	49½
Rate for Money.	7@7½	7@8½	7½@8	6½@7

NOTING AND COMMENTING.

THE month has brought nothing of moment in the way of English news. The annual University boat race, the importance of which in the English love of sport is only equalled by the Derby, and for which even parliament adjourned, was bravely rowed, and won by the Cambridge during a very heavy snowstorm. A somewhat better tone is noticeable in the discussion upon the "indirect damages" question, and the note of Secretary Fish seems to have quieted Mr. Gladstone's angry passions not a little. The opposition has tried hard, both in the lords and commons, to have the American answer made public; but both Mr. Gladstone and Lord Granville have referred to the precedent afforded by the conduct of the American senate and house, whose admirable behavior in declining to ask for the note of her majesty's ministers, is somewhat in contrast with that of parliament. Meanwhile another dispatch has been forwarded to the American cabinet, and there is every prospect of an interminable diplomatic war. Sir Charles Dilke's motion in the commons to investigate the expenses of the crown was something of an excitement and a sign. The motion was lost, and by a vote of 274 to 2, or, more accurately, 276 to 4, as two members of each party are by custom named as tellers, and are without votes. The attempted assassination of the queen, or rather an apparent attempt, turning out to be a piece of idiotic bravado, has given a rather farcical ending to what at first had a tragic air. The Tlohorne case has ended as melodramatically as it began, and the claimant—and apparently the successful claimant—to one of the great estates of the realm is now lying in prison on the charge of perjury.

The commercial policy of M. Thiers has been made the subject of remonstrance by both the English and Spanish governments, and Senor Olazaga, minister from the latter country, has threatened reprisals in case the French government insists upon repealing the treaty with Spain. The recent tax has exceeded the estimates by about 30,000,000*fr.*; so that the government is temporarily relieved from the unpleasant, and perhaps dangerous, necessity of pushing the measure for the taxation of raw material until after the recess. The debate upon the

Catholic petitions was ingeniously avoided by President Thiers, whose appeal to Monseigneur Dupanloup seems to have entirely overcome the worthy bishop. The court martial of Gen. Bazaine promises to reveal the long supposed mystery of the surrender of Metz, and may perhaps show the absurdity of the constructions which have been placed upon Bazaine's conduct. The army estimates are very low—so low that the most pacific intentions would be attributable to the government, were it not for certain other items, such as several million francs for the fortification of Paris, as well as other sums for Longwy, Belfort, and other towns. That the resources of the republic are not quite exhausted is satisfactorily proved by the report of the minister of finance showing a balance, after the recent payment of the four and a half milliards of indemnity, of five hundred and fifty millions of francs.

On the 22d of March the emperor of Germany celebrated the seventy-fifth anniversary of his birthday. Owing to his still feeble health no public demonstration, excepting the illumination of Berlin, was permitted. On the night of the 19th a disastrous fire in Dusseldorf consumed the famous art gallery of the town, with a large number of the most valuable paintings of the collection. The war between Prince Bismarck and the ultramontanes still continues. On the 7th of March, when the prince was hurling defiance at the German house of peers and the Catholic clergy—and not only on the same day, but at the same hour, according to some European papers, earthquake shocks were felt all through the central portions of the German empire. The telegraph on that day brought into Berlin news of slight convulsions at Weimar, Rudolstadt, Dresden, and many other places—all the perturbations having occurred at the same time. Berlin shook likewise; though this fact was not talked of until the tidings came in of earthquakes elsewhere. The imperturbable Germans smoked their pipes with characteristic equanimity at these remarkable manifestations of "divine" anger, as elsewhere supposed. The archbishop of Cologne has recently excommunicated Profs. Hilgus, Knoudt, Langen, and Rusch—all very well known scientists of the university of Berne—for their rejection

of the dogma of papal infallibility. The annual budget of the upper Prussian house, it is said, shows a surplus of 14,500,000 thalers, making a total of 44,000,000 to be applied in reduction of the public debt. Statistics in reference to the recent elections in Germany show that there are 332 districts, comprising 7,400,000 electors. Of these, 3,879,187, or 52 per cent., voted; and 2,515,964 votes were cast for the persons elected, and 1,363,333 for the minority candidates. The strength of the respective parties is as follows: The "national liberals," supporting Prince Bismarck, cast 803,046 votes; the "centre," 437,790; the "old conservatives," 291,861; the "progressionists," 249,329; the "ultramontanians," 248,243; "southern liberals," 199,627; and the "Polish" party, 120,238.

On March 21st the chamber of deputies of the Italian parliament, at Rome, adopted a resolution of confidence in the ministry by a vote of 239 to 170. Italy has lost a great man in the death of Giuseppe Mazzini, the well-known Italian republican, a biography of whom can be found in a former issue of this Review. He was the greatest of Italy's great men who took up early in this century the best things that came out of the French revolution; above all, the great doctrine that every nation has the right to determine its own destinies. The year 1839 brought to him the realization, in a large degree, of all he had suffered and longed for; and yet, with all this success before him, his last public utterances were as clear and healthful, as to the rational progress of political life and the rational basis of civil society, as though his life had been spent in a long debate over the questions, and not as one who had fought bravely for the principles he saw within them. Italy owes his memory a noble monument, and one that civic processions and public addresses will not build for the Italian republicans of to-day.

—THE coliseum at Boston, in which the peace jubilee is to be held, will accommodate 75,000 spectators and a chorus of 20,000 voices. The arched truss of the building will be 180 feet high and 310 feet wide at the base. The trusses to span and support the roof will be made of iron with a wooden framework 15 feet deep, and will be placed 22 feet apart, and will be bolted to the piles upon which the building is to stand. This will do away with posts and pillars, which would greatly obstruct the view of spectators. The base of the building will be bound together by heavy iron rods, an inch and a half in diameter, running across from side to side, secured with plates, thus preventing any possibility of the spreading of the walls. The floor will rest upon the solid earth. The galleries will be 75 feet deep, and will be supported by pillars resting on the piling, and by other independent supports, while the cross-timbers will be framed into the walls and bolted to the trusses.

—THE official reports of forty-three banks of Boston, for the period between March 1, 1865, and November 1, 1871, show an average surplus

earning on a capital of \$35,050,000 of more than 31 per cent., two-thirds of which, or 14 per cent., has been accumulated in six years and a half of business. In addition to this, the average regular dividends have been 69 per cent. of the capital for the same period—making a total of 83 per cent. in six years and a half, or a little less than at the rate of 14 per cent. per annum. If extra dividends are added, the profits will exceed 14 per cent. per annum. The average price of bank stock was \$117½ on January 2, 1872, including great and small banks, and at this price those who went in at par in 1865 can close out at an average profit of \$2.50 per share, in addition to an income of about 10½ per cent. annually.

—THE preliminary work towards the manner and conditions of holding the centennial of American independence in Philadelphia has been done by the assembly (in the city of Philadelphia on the 4th of March last) of the commissioners appointed by the various States for that purpose. The commissioners were received by the mayor in Independence hall, where, after an address of welcome and a response by ex Gov. Hawley, of Connecticut, they adjourned to the common council chamber, and there subsequently effected an organization. The several committees to carry out the purpose of organization were then appointed, and the earnest spirit actuating the whole body was shown in a manner that speaks well for the progress of the idea of this grand commemoration, whose ultimate character is yet but in germ.

—THE committee appointed to investigate the affairs of the Market Savings Bank, New York, have made a report, in which they say they do not deem it prudent to disclose the entire result of the investigation; but from the present position of savings banks in the State, as partially exposed by them, they conclude that the failure of other savings banks is not impossible at any moment. They advise that depositors in savings banks form an association and raise funds to the amount of \$100,000 to support such banks.

—THE name of Charles Platt, Esq., vice-president of the Insurance Co. of North America, has been circulated in connection with another insurance appointment, and his acceptance thereof. Such statement is not correct; nor will Mr. Platt, under any circumstances, withdraw from the Insurance Co. of North America.

—SUIT has been brought in the courts of Pennsylvania by the Rhees & Howell Manufacturing Company against the estate of Mr. Rhees, who committed suicide while under contract to act as the company's general agent and manufacturer for a term of years yet unexpired. The suit is for damages sustained by the non-fulfilment of the contract, and it awakens considerable interest.

—IN Cashmere one hundred thousand persons are employed in the shawl manufacture. The weavers are all males; most of the spinners women. A female spinner earns about seventy-five cents a month. The weaving of a shawl of ordinary pattern occupies three weavers for three months; the more elaborate and costly from twelve to fifteen months.

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THE WINGED ARCHITECTS.

IT is commonly assumed that birds build their nests by pure instinct. If, however, their methods of building are closely observed and compared with their general habits, many marks of reason may be discovered, and instinct seems to have a comparatively small share in the process. How small that share is cannot now be determined, for it has never been submitted to any crucial test. That it is smaller than is generally supposed seems to be the natural conclusion from the considerations to be presented in this essay, the object of which, however, is not to impart information respecting birds' nests, but to contribute something towards a better understanding of the mental phenomena properly called instinctive, by distinguishing from them certain rational actions which are too often confounded with them.

Instinct learns nothing by experience, and performs its actions without knowledge of what their most important effects will be. Reason, on the contrary, improves by practice, and acts with reference to a more or less remote future. Perhaps the best specimens of instinctive construction are the cocoons of the lepidoptera. In early summer the caterpillars are hatched, and at once commence their devastating career among the green leaves. After a short season of voracity the change comes, and without any previous instructions from their parents (who, indeed, died long before they came into existence); without any means of learning the intimate structure or the use of the deserted shells of their

ancestors, which they may perhaps meet with now and then in their wanderings; without any possibility of foreseeing the marvellous series of changes which they are destined to undergo, they suddenly commence spinning and weaving around themselves curious coverings accurately adapted to their future needs, the form and texture being always the same for the same species; and in these close quarters they patiently wait, without knowing why, till the time comes for their shells to be split or pierced, and themselves to creep out into the air as perfect moths and butterflies.

Birds build under widely different circumstances. In the first place, they are not altogether wanting in experience of the kind of work they have before them. The early part of their lives is passed in a nest, and they have then every opportunity of becoming acquainted with its shape and construction. While learning to fly they leave it and return to it frequently, and are able to examine it inside and outside in every detail. Their daily search for food, too, must continually lead them among the materials it is made of; and they must also meet with many other nests of the same kind, which their early life in their own has naturally predisposed them to notice. The positions in which such nests are situated, their form, their size, the materials of which they are built, and the manner in which these materials are put together, thus early become familiar to the young of each species. Observations like these go on from their birth in May or June till the time of their autumnal migration; and in the case of birds which do not migrate, are continued through the winter also.

Then, in the following spring, the materials for nests come in their way while they are seeking for food in the well-explored haunts; the old situations are there, and the remnants of the previous summer's homes are conspicuous through the thin foliage. What is more natural than that old memories should return and supply much of the knowledge requisite for constructing new homes? Much, but not all. It is by no means a violent supposition that the younger birds learn a great deal from their more experienced companions, and it seems well established that their first attempts are comparatively imperfect. M. Leroy, ranger of Versailles and Marly under Louis XVI, a very assiduous observer, says: "The nests of young birds are almost invariably ill-made and badly situated; frequently the young hen-birds will lay their eggs in the first place they come to." They remedy their defects, he tells us, when they have experienced the inconveniences of their former course, "cautiously feeling their way, and only attaining the so-called certainty of instinct after the lessons consequent on failure." The great American ornithologist, Wilson, also believes "that the less perfect nests are built

by the younger, the more perfect by the older birds." Mr. Wallace, too, whose extensive researches in the Malay archipelago are only surpassed by his original but well-guarded theories on the origin of species, makes the following remark: "It seems highly probable that the older birds would begin building first, and that those born the preceding summer would follow their example, learning from them how the foundations of the nest are laid and the materials put together." The same eminent naturalist believes that young birds do not generally pair with one another, but that in each pair there is frequently one bird more than a year old, which, to a certain extent, guides its partner.

Such a supposition accords well with the fact that birds are able to communicate their ideas to each other much more fully than is generally supposed. There is even some reason for the belief that they have, like ourselves, an articulate language, quite worthy to be compared with that of some uncivilized nations of mankind. We are told that there are savage tribes whose vocabulary does not exceed three hundred words. Birds may perhaps make some approach to this. The fact that their notes appear to us inarticulate, and seem to consist of a constant repetition of the same sounds, is by no means decisive of the question. When we listen to any language of which we know nothing, the sounds appear to us very monotonous; and we have a strong tendency to underrate the speech of those whom we deem inferior. The very name *barbarian*, applied by the Greeks to all nations but themselves, was a contemptuous imitation of what they supposed the senseless and infantine jabbering of the poor wretches who had not the good fortune to be Greeks. In the case of birds, such a difficulty of appreciating the variety of their utterances is intensified by the differences between their organs and ours, which make it practically impossible for us to distinguish delicate variations of accent, inflection, and expression. Yet as some nations make much more use of these distinctions than we do, why may not birds do the same? They do not certainly mistake the intonations of terror for those of love. M. Leroy tells us, moreover, that the cries of alarm made by the mother birds differ with the different dangers against which they wish to warn their young, and that the actions of the young birds vary according to the warning they have received. He mentions in the same connection that the migration of swallows is preceded by long and frequent assemblages, at which there is an incessant and varied twittering. He takes it that they are discussing what is for the general good, and instructing the younger birds, which, soon after, make frequent trials of flight. "Assemblies of men who should speak a foreign language could not give more evident signs of a similar project."

These assemblages call to mind the extraordinary meetings of crows

occasionally held in the northern parts of Scotland and in the Faroe islands. "They collect in great numbers," says Dr. Edmonson, "as if they had all been summoned for the occasion; a few of the flock sit with drooping heads, and others seem as grave as judges, while others again are exceedingly active and noisy: in the course of about one hour they disperse, and it is not uncommon, after they have flown away, to find one or two left dead on the spot. These meetings will sometimes continue for a day or two before the object, whatever it may be, is completed. Crows continue to arrive from all quarters during the session. As soon as they have all arrived, a very general noise ensues; and, shortly after, the whole fall upon one or two individuals, and put them to death. When the execution has been performed, they quietly disperse." Sparrows are said to act in a similar way. Sometimes a force of half a dozen or so may be seen clustering tumultuously in the air, sharply punishing an offender. Herons, too, often hold councils. A large assembly is said by Mr. Jesse to take place at certain times of the year at Richmond park. They come from quite distant heronries, and congregate together in an apparently listless manner. Their object in these meetings is not known. At other times herons are remarkably unsocial birds: one seldom sees more than two or three of them in the same place, and then only when they are watching for their prey.

In Jamaica there is a crow familiarly called the jabbering crow, spoken of by Mr. Gosse. Two of them will perch together and chatter to each other for a long time. Observers who are most familiar with their ways believe that their object is the interchange of ideas. It is also stated that rooks, when sitting together on their trees, often salute members of their fraternity, as they return from distant parts, with loud cries, as if asking for news; and that after each fresh arrival fresh chattering takes place.

The communication of ideas among storks is shown by numerous well-authenticated anecdotes. Bingley tells of a stork caught by a farmer near Hamburg, and intended for a companion to a tame one previously kept on the premises; but the tame one fell upon the new comer and beat him so severely that he made his escape from the place. About four months afterward, however, the defeated stork returned with three others, and all made a combined attack on the tame one and killed him. Mrs. Lee, in her *Anecdotes of Birds*, gives an interesting account of a pair of storks in Smyrna, whose eggs were taken away by a French surgeon, and replaced by those of a hen. "In the course of time the young chickens came forth, much to the astonishment of the two old birds. Shortly afterwards the male went off, and was not seen for two or three days; but at the end of that time he returned with a great

crowd of his companions, who all assembled in a circle, taking no notice of the numerous spectators which so unusual an occurrence had attracted. The female stork was then brought forward into the midst of them, and, after some seeming consultation, the whole flock fell upon her and tore her to pieces." The same authoress also vouches for a similar case on the estate of a gentleman of landed property in Berlin. When the male bird in this instance perceived the difference between what was and what ought to have been, he first flew round and round the nest with loud screams, and then disappeared. The fourth day after, the inmates of the house were disturbed by loud and discordant cries in a field near the nest. On going toward the spot they saw an assemblage of at least five hundred storks, of whom one, standing about twenty rods before the rest, was apparently making a harangue, "to which the others seemed to listen with evident emotion." When he ceased, another came forward, and seemed to address the meeting; and so several others in succession. Finally, they all rose together, uttering dismal cries, organized themselves under a leader, made for the nest, from which the female stork had been watching the proceedings with apparent apprehension, and completely picked her to pieces, together with the spurious offspring and the nest. Since that time no stork has been seen in the neighborhood. Instances like these seem not only to show a quite extensive power among birds of making one another partners of their thoughts, but also to establish a probability that this is done by means of articulate language.

However this may be, that they have some mode of communication is not to be doubted. They probably carry the language of signs to a considerable degree of perfection. Mr. Tylor has treated this subject with regard to men, showing the existence of a half-imitative, half-arbitrary language of signs, mutually understood by many tribes who are totally ignorant of each other's speech. As to birds, we know that they understand a great deal of one another's motions, and may have developed a high capacity for observing their elders' movements in building. At any rate, all such possibilities should be experimented on before we assume complex organizations of unconscious intelligence to account for what may be done by conscious reasoning. An experiment might be tried on a large scale of enclosing and covering with netting a portion of ground containing a few trees and abundant materials for nests, and putting in it young birds of some species which builds highly-finished nests, these birds having been hatched away from nests by artificial warmth, and never allowed any communication with others of their species. If they should choose the same materials, the same situation, and build in exactly the same way as their parents did, the proof of

instinct would be complete. To make the experiment decisive the other way, old experienced birds would have to be subjected to the same conditions, to see if they would build as usual.

With regard to the song of birds, which is thought to be equally instinctive, the experiment has been tried, and it is found that when young birds are brought up with birds of other kinds, they do not have the note peculiar to their own species, but acquire that of those with which they are associated. The Hon. Daines Barrington gives an account of a number of experiments of this kind in the *Philosophical Transactions* for 1773. "I have educated nestling linnets," he says, "under the three best singing larks—the sky lark, wood lark, and tit lark—every one of which, instead of the linnet's song, adhered to that of their respective instructors. When the note of the tit lark linnet was thoroughly fixed, I hung the bird in a room with two common linnets for a quarter of a year, which were full in song; the tit lark linnet, however, did not borrow any passage from the linnet's song, but adhered steadfastly to that of the tit lark." Rev. W. H. Herbert, J. M. Bechstein, and others, have made similar experiments, and the result shows in every case that the notes of birds are learned while they are very young, just as a child learns to speak his mother tongue, by imitating the language of those around him. The early age at which the observation and memory of birds become active is shown by the fact that notes which they hear only in the first three or four days of their existence are afterwards imitated by them. Hence it would be strange if they remained for weeks in a nest, and afterwards knew nothing of its materials or how they were put together. It accords with the reasoning that the kinds of birds which soon quit their birthplace build very simple and rough nests, while the nests which require much skill and care are built by the species whose young remain in them for a long time.

But the question is put: If birds build by the exercise of the same mental faculties as men do, why does each species keep to the same old plan? Men continually improve their dwellings. Look at the refinements of modern architecture. This is what reason leads to, whereas instinct is forever stationary.

Now, if this argument were sound, it would prove too much; for, as a rule, the greater number of mankind have very little capacity for self-improvement, and imitate the ways of their ancestors almost as fully as birds do. "The tents of the Arabs," says Mr. Wallace, "are the same now as they were two or three thousand years ago, and the mud villages of Egypt can scarcely have improved since the time of the Pharaohs. The palm-leaf huts and hovels of the various tribes of South America

and the Malay archipelago, what have they improved from since those regions were first inhabited? The Patagonian's rude shelter of leaves, the hollowed bank of the South African earthmen, we cannot even conceive to have been ever inferior to what they now are." The character of a savage's hut is largely determined by the nature of the country, the climate, the habits of the enemies he has to dread, and the materials at hand. When a mode of building well suited to these is once adopted, it becomes fixed by custom and imitation, the lower races not usually observing defects which do not put them in considerable bodily danger or discomfort.

The case is precisely the same with birds. Each kind uses the materials which lie most naturally in its way, and builds where its habits lead it, imitating the nests of its species which it has become familiar with, and disregarding defects which lead to little or no harm. It is not true, however, that birds' nests are invariable for the same species. Naturalists are agreed that there is a great variety in this respect. Moreover, cases are not wanting of permanent improvements made by whole families of birds. Dr. Brewer, of Boston, perhaps the best ornithologist in the United States, tells us that the large family of swallows, including the martins, "now build their nests in a manner very different from, and in many respects greatly superior to, that in which they were enabled to build before the dwellings of civilization appeared on this continent." There is ample evidence that the barn swallows of New England, now abundant, were rare two hundred years ago, and built a simple mud nest under some projecting ledge of rock. They still do so in wild parts of the country. Now, they build in New England curiously elaborated nests in barns under the shelter of comfortable roofs. They have recently got to making a solid projecting platform on the edge of the nest, for the male to sit on while his partner is occupied in her maternal duties. Another species, formerly building in exposed places, and making a covered nest something like the retort of a chemist, with a long tubular opening from below, has now placed itself under the protection of man, building under the eaves of houses an improved nest, open at the top. Mr. Wallace says that the English house sparrow and the gold-crested warbler build domed nests in exposed situations, and open ones under shelter. Another change in the habits of a species mentioned by Dr. Brewer, is in the proverbially stupid gull, which, "at Grand Manan, taught by generations of persecutions, and robbed of its eggs with ruthless greed by man, no longer nests on the treacherous shore, but with its clumsy webbed feet builds itself a nest in high inaccessible forest trees."

As to the intelligence sometimes shown by single birds in building,

many anecdotes have been related. Mrs. Lee mentions a pair of magpies that built their nest in a gooseberry bush in a neighborhood where there were no trees; but, as it was accessible to foxes and cats, they barricaded the whole bush with briars and prickly thorn bushes, dragging them to the spot with their united strength, and twining them in a barrier a foot thick, so firm that even a man could not make his way to the young without a hedge-knife. The same authoress tells us of a pair of goldfinches whose growing brood was getting too heavy for the bough on which they had built, and who fastened this bough to a stronger one over it by means of a piece of string which they had picked up. Mr. Jesse says that a swallow in a gentleman's garden in Northumberland, wishing to build her nest in a corner formed by two walls at right angles, and finding no ledge nor projection large enough to support it, fixed a small bracket of clay on each wall at a little distance from their intersection, and then laid a stick across with its ends resting on the brackets, forming a foundation on which she afterwards built with perfect security. Such acts as these do not result from instinct alone.

Mr. Wallace does not recognize any kind of mental action to which the term instinct is appropriate. It is here held, however, that there is such a kind, an unconscious operation of the mind, comprehending a number of simple acts, organized into a complex series, and each following its predecessor with the necessity of mechanism. It is not confined to the lower animals, but directs many of the habitual and vital actions of man. It has probably some share in nest-building. But, as it would be impossible here to enter fully into its nature, no attempt has been made to show what part it does play there, only what part it does not. A further consideration in the same connection is that birds' nests are often seriously imperfect. A settled, well-marked instinct does its work to perfection. Birds, however, often build negligently and inefficiently. The American pigeon frequently crowds the branches with its nests till they break, and the eggs are shattered and the young birds perish; rooks' nests are often so badly constructed that in high winds the eggs are tossed out; and White, of Selborne, tells us that the window swallow continually builds in places where heavy rains wash the nests away and destroy the young ones.

Thus the old orthodox doctrine that man directs his actions by reason, and all other animals theirs by instinct, is shown to be inconsistent with facts. It has been discarded by naturalists, and only retains its hold on the minds of the ill-informed, who have learned it in youth from the approved text-books. Its main support is probably our vanity, though it is really absurd to suppose that a recognition of our affinities to other animals involves any treason to the dignity of man. On this

point nothing better can be referred to than has been said by Sydney Smith: "I feel myself so much at my ease about the superiority of mankind, I have such a marked and decided contempt for the understanding of every baboon I have ever seen, I feel so sure that the blue ape without a tail will never rival us in poetry, painting, and music, that I see no reason whatever that justice may not be done to the few fragments of soul and tatters of understanding which they may really possess. I have sometimes, perhaps, felt a little uneasy at Exeter 'Change, from contrasting the monkeys with the 'prentice boys who were teasing them; but a few pages of Locke, or a few lines from Milton, have always restored me to tranquillity, and convinced me that the superiority of man had nothing to fear."

A BLIND MAN'S SIGHT.

THE work of W. Hanks Levy on *Blindness and the Blind* (London) gives us a blind man's experience in respect to those perceptions which, in a measure, occupy the vacuity of the absent vision. Says the *Saturday Review*:—

From none but one of themselves could we hope to gain anything like a thorough and adequate expression of the thoughts, the emotions, and the cravings which we instinctively associate with the sad lot of the blind. It is to his personal experience of this privation, as enhancing the powers of an otherwise observant collector of facts, fairly adept at the processes of generalization, that much of the value as well as of the pathetic interest which belongs to Mr. Levy's little volume is justly due. In *Blindness and the Blind* we have not only a practical treatise upon the causes, the treatment, and the cure of loss of sight, with such alleviations of this terrible physical evil as it is the object of the new science or art of typhology to introduce and to develop, but we have the advantage of being taken, so to say, into companionship with a mind capable of analyzing and giving form to its own existence, workings, and impressions, and, by the enforced concentration of its powers upon a limited range of the objects of perception, throwing an exceptionally strong and vivid light upon many of the central problems of psychology. A large portion of Mr. Levy's book, interesting as it is throughout, might have been compiled by any one whose sympathies, either of a philanthropic or a philosophical kind, or whose professional calling by itself might have led him to accumulate facts and figures relative to the

blind, their proportion to the population at large, the causes of blindness, whether congenital or assignable to accident or disease, the methods of training and educating the blind, with the respective merits of rival systems of reading, tangible maps, globes, and other adjuncts to imparting knowledge, together with what we may call the literature of blindness—the long list of those who from the earliest times have shown themselves great, wise, and admirable under one of the direst of natural calamities or privations. There would be, we need hardly say, a definite superiority on the side of one who approached this wider province of his task in the full fruition of the bodily senses. We are indeed reminded of the drawback from literary excellence which must needs be imposed where one special faculty is lacking, by the occurrence in the book before us of lapses which the glance of an eye would surely have obviated, a word, or even a line or two, having dropped out here and there, with other failings in the text which lie beyond the pale of ordinary misprints. What, however, on the other hand, we should have looked for in vain from the highest habits of industry and intelligence on the part of “sighted persons,” as they are termed by their less privileged fellows, is the statement of such primary facts as spring from the personal consciousness of the blind, and come to us consequently with an authority which is all their own.

No part of Mr. Levy's work is of more value or interest than that which treats of the influence of the loss of one sense upon those which remain. It has been doubted, even by those more immediately occupied with matters relating to the blind, how far such a loss is made up by increased power in the remaining senses. From Mr. Levy's mode of approaching the question we infer that he is conscious of a distinction between the total or absolute fund of nervous power possessed by the brain or seat of nerve force, and the relative amount expended in the way of sensitive action. It is evident, he remarks, that a certain amount of nervous power is excited by every action of the mind or body. This being so, it is clear that a sighted man expends more nervous power through the medium of the eye than he does in connection with the organs of any other sense. “When, however, the sense of sight is wanting, the nervous power usually exerted by it is employed by the other senses.” Thus the powers of perception by hearing, touch, &c., enjoyed by a blind man in common with his sighted brethren are more acute than they would be but for this partial privation. This concentration of energy, though it mitigates, cannot indeed wholly compensate for the loss of sight. The special impressions formed by one sense-organ cannot of course be acquired by the use of any other organ. Yet the power or keenness of the remaining organ is actually enhanced by

the extra amount of nervous energy thrown upon it. The sense of touch, for instance, can never be cultivated so highly in a man who can see as in one who is blind, for the simple reason that, whereas the nervous power of the man who sees is diffused through five senses, in the sightless it is more concentrated, being diffused only through four senses. This conclusion, we need hardly repeat, is altogether apart from the question whether the total energy possessed or exerted by those who are defective in any sense is on a par with that of those who enjoy the full complement of senses. How much gain of force, to say no more, may there not be of a reflex kind in the impressions formed or the stimulus excited by the contact, through the medium of sense, of the various ranges of external objects corresponding to the different sensitive organs? The relative amount of nervous power, moreover, latent in, or exerted by, the different senses is no doubt far from equal in all. If, then, it is conceded that the highest amount of relative strength or energy belongs to sight, the greater must be the residual degree of force thrown into the action of the other senses when the action of sight is suspended:—

The senses are like five wires radiating from an electric battery, commonly called the brain. These wires, or senses, differ in their capacity for conducting nervous power—the largest wire, *i. e.* the sense of sight, carrying and applying perhaps more nervous power than the other four wires or senses combined. If the largest wire be disconnected from the battery, the whole power of the battery is thrown into the four wires; and so when sight is wanting, the whole nervous power of the human system is thrown into the remaining four senses, which gives to them an increased power of development.

The senses of hearing, smell, and sight have been properly called the distant senses; touch and taste the near senses. The former only perceive through the medium of air and light, while the latter act through immediate contact with the objects perceived. Distinct, however, as they are, each in its special sphere, psychology has done much to trace the laws whereby they are fitted to render mutual service to each other, so that, for instance, the perceptions of the eye may be corrected by the touch and other senses. The perception of distance has been shown to result from the correlation of the impressions made by more than that single organ of sense. A wide class of phenomena, full of importance to the science of the mind, is that which has been called the "unrecognized senses." Besides the five senses universally recognized, it is beyond doubt that man possesses certain powers which are neither to be classified among the senses nor among the faculties. Such, for instance, is the power which enables a man to perceive the quality of weight, a power to which has been assigned the name of the muscular sense, or sense of weight. There are, however, further phenomena to which the

admission of this sixth sense supplies no explanation. And to some of these facts the peculiar sensitiveness of the blind has enabled our author to refer with a degree of authority which we unreservedly recognize, without feeling bound by his conclusion that they are only to be explained by admitting the existence of "as many senses as there are independent powers of perception in man," seven or eight senses at the least having to be thus recognized. Whether in the house or in the open air, whether walking or standing still, Mr. Levy can tell when he is opposite a solid object, and can discriminate whether it is tall or short, slender or bulky. He can also detect whether it is a solitary object or a continuous fence; whether it is a close fence or composed of open rails, and often whether it is a wooden fence, a brick or stone wall, or a quickset hedge. He cannot usually perceive objects if much lower than his shoulder, but sometimes very low objects can be detected. This, he thinks, may depend upon the nature of the objects or some abnormal state of the atmosphere. The currents of air can have nothing to do with this power, since the state of the wind does not directly affect it. Nor has the sense of hearing anything to do with it, since, when the snow lies thickly on the ground, objects are felt to be more distinct, although the footfall cannot be heard. It seems to him that he perceives objects "through the skin of his face," and has the impression immediately transmitted to the brain. The only part of his body which possesses this power is his face, as he has ascertained by a series of experiments. Stopping his ears does not interfere with it; but covering his face with a thick veil destroys it altogether.

None of the five senses having anything to do with the existence of this power, the circumstances he has named induce him to call this unrecognized sense by the name of "facial perception." Dr. Saunderson, equally blind, could tell when a cloud obscured the horizon. At one time Mr. Levy could himself do this with great accuracy, but he cannot now trust himself in this respect. Whether long residence in London, "where clouds may be said to be the rule," may account for this he cannot say. He has known many persons totally blind, Mr. Farrow among others, who had this power. The presence of fog interferes greatly with facial perception, the impressions of objects being then faint and untrustworthy. The drier the atmosphere the more perfect does experiment show the exercise of this sense to be. Day or night makes no difference to the faculty. When passing along a street Mr. Levy can distinguish shops from private houses, and can even point out the doors and windows, and this whether the doors be shut or open. On one occasion, walking in a lane, this perception enabled him to judge more correctly than the sight of a companion as to the height of a fence

between the road and a field. He believes himself to have here a succession of proofs sufficient to establish the existence of a special sense possessed indeed by all, but unrecognized in all but the blind, on account of the all-absorbing claims of the eye. It is likewise, he thinks, of a more secret and subtle nature than any of the other senses.

Now, keen and correct as Mr. Levy has shown himself in the observation of facts, he has obviously fallen into the common fallacy of those who would take for granted the existence of a new cause, while there is nothing all the while in the phenomena observed but that well-known causes are amply adequate to explain. The various impressions of which he is so acutely sensible resolve themselves into nothing more than so many conditions of atmospheric pressure, the delicate surfaces and avenues of sense, abnormally sensitive in the blind, appreciating changes exceedingly slight and transient in the fluid medium in contact with them. In free and open air the impression upon these highly organized and nervous surfaces will be a corresponding feeling of openness and freedom on all sides. Let them now be brought near to a solid and inert body like a wall or paling, and the substitution on one side of so much hard and inelastic matter for the elastic and yielding atmosphere will readily make itself felt. Degrees of hardness, or breaks of continuity in the barriers thus opposed to free circulation, will even become appreciable to an extent sufficient to explain the phenomena which so struck Mr. Levy whenever he took his walks abroad. Everybody must have felt at times the effect produced by an open door even in the stillest room. Similar in kind, however more subtle in degree, must be the effect of a cloud closing in upon and weighing down the atmosphere; the pressure of which, extending in all directions, penetrates to and influences all the tactual organs of the body. The hearing, as such, would not be sensitive to this change of pressure, but the tympanum of the ear would be mechanically affected by it, whilst the general sensation would be most effectively described as distributed over the skin of the face. This exactly corresponds with what Mr. Levy describes as his experience. Hence, too, the importance of a dry and elastic state of the atmosphere. There is not the slightest need for invoking the agency of electricity, as Mr. Levy is inclined to do. He is quite right, we believe, in his conviction that various substances, such as iron, wood, stone, &c., will be found to convey different impressions to the face, and that in close relation to their various degrees of elasticity, just as they are known to differ in their effects upon sound.

By the simple suggestion of an intense perception of the interference of solid bodies with the normal elasticity of the air, we may hope to explain the adroit way in which creatures, blind as bats, in their flight

keep clear of walls, trees, and other obstacles. The cultivation of the like faculty has no little to do with the power of the blind to walk alone, though the stick must be in general, and to the less gifted or trained order of sightless walkers, the guide and safeguard of their steps. We note it, by the way, as a subject of national complacency, indicative of superior physical or mental fibre, that the practice of their English compereers in traversing the streets of London without a guide was the cause of much surprise to the blind of Paris, to whom the author mentioned that fact during a visit some years ago. It disappoints us to find Mr. Levy dismissing so summarily as he does, in his remarks upon the sense of touch, all questions about the power of the blind to discriminate colors, even the most strongly marked. All that touch can do, he declares, is to distinguish between surfaces; it cannot feel rays of light. And he quotes Sir Charles Bell as equally restricting the capacity of touch in his treatise upon the Hand. As color makes no alteration in the surface of an object, touch, it is argued, cannot deal with it. Widely spread as the opposite belief has been and is, we are told to look upon it as a fallacy due to impostors or "interested persons." We are sorry that Mr. Levy should have passed without notice the suggestion that latent heat may possibly cause objects the same in material or stuff to differ perceptibly in warmth to a delicate touch according to their difference of hue. It has been held by some within our own knowledge, by seeing persons even, that they could by this test distinguish, at all events, broad differences like those of black and white, or red, yellow, and blue, in substances like silk, cotton, or cloth. The problem is, at all events, one which calls for further experiment and verification, and we should rejoice to see it made the subject of thorough and careful study by one with Mr. Levy's special powers and opportunities both of observation and analysis.

IMAGERY AS SENSATIONS.

THE influence of Charles Dickens upon his readers—the secret of his mastery—has always been the perplexity of a class of critics, who, scornfully admitting the fact which existed, took revenge for their admission, by denying that in his case the effects produced were rationally due to the apparent causes. G. H. Lewes, in a study of the relation of Dickens to criticism, enters into a psychological analysis of Dickens's literary idiosyncrasy, which serves to explain, in part at least, that close companionship of himself and his creations which made him to many

readers always present, always along with, always mingling with his characters. Mr. Lewes's theory places the great writer on the border-land of hallucination; his visions were sensations, experiences, facts—and they were received as they were written. We give the exposition of the idea:—

Great as Dickens is in fun, so great that Fielding and Smollett are small in comparison, he would have been only a passing amusement for the world had he not been gifted with an imagination of marvellous vividness, and an emotional, sympathetic nature capable of furnishing that imagination with elements of universal power. Of him it may be said with less exaggeration than of most poets, that he was of "imagination all compact;" if the other higher faculties were singularly deficient in him, this faculty was imperial. He was a seer of visions; and his visions were of objects at once familiar and potent. Psychologists will understand both the extent and limitation of the remark, when I say that in no other perfectly sane mind (Blake, I believe, was not perfectly sane) have I observed vividness of imagination approaching so closely to hallucination. Many who are not psychologists may have had some experience in themselves, or in others, of that abnormal condition in which a man hears voices and sees objects with the distinctness of direct perception, although silence and darkness are without him; these *revived* impressions, revived by an internal cause, have precisely the same force and clearness which the impressions originally had when produced by an external cause. In the same degree of vividness are the images *constructed* by his mind in explanation of the voices heard or objects seen: when he imagines that the voice proceeds from a personal friend, or from Satan tempting him, the friend or Satan stands before him with the distinctness of objective reality; when he imagines that he himself has been transformed into a bear, his hands are seen by him as paws. In vain you represent to him that the voices he hears have no external existence; he will answer, as a patient pertinently answered Lélut: "You believe that I am speaking to you because you hear me; is it not so? Very well, I believe that voices are speaking to me because I hear them." There is no power of effacing such conviction by argument. You may get the patient to assent to any premises you please, he will not swerve from his conclusions. I once argued with a patient who believed he had been transformed into a bear; he was quite willing to admit that the idea of such transformation was utterly at variance with all experience; but he always returned to his position that God being omnipotent there was no reason to doubt his power of transforming men into bears: what remained fixed in his mind was the image of himself under a bear's form.

The characteristic point in the hallucinations of the insane, that which distinguishes them from hallucinations equally vivid in the sane, is the coercion of the image in *suppressing comparison* and all control of experience. Belief always accompanies a vivid image, for a time; but in the sane this belief will not persist against rational control. If I see a stick partly under water, it is impossible for me not to have the same feeling which would be produced by a bent stick out of the water; if I see two plane images in the stereoscope, it is impossible not to have the feeling of seeing one solid object. But these beliefs are rapidly displaced by reference to experience. I know the stick is not bent, and that it will not appear bent when removed from the water. I know the seeming solid is not an object in relief, but two plane pictures. It is by similar focal adjustment of the mind that sane people know that their hallucinations are unreal. The images may have the vividness of real objects, but they have not the properties of real objects, they do not preserve consistent relations with other facts, they appear in contradiction to other beliefs. Thus, if I see a black cat on the chair opposite, yet on my approaching the chair feel no soft object; and if my terrier on the hearth-rug looking in the direction of the chair shows none of the well-known agitation which the sight of a cat produces, I conclude, in spite of its distinctness, that the image is an hallucination.

Returning from this digression, let me say that I am very far indeed from wishing to imply any agreement in the common notion that "great wits to madness nearly are allied;" on the contrary, my studies have led to the conviction that nothing is less like genius than insanity, although some men of genius have had occasional attacks; and further, that I have never observed any trace of the insane temperament in Dickens's works, or life, they being indeed singularly free even from the eccentricities which often accompany exceptional powers: nevertheless, with all due limitations, it is true that there is considerable light shed upon his works by the action of the imagination in hallucination. To him, also, *revived* images have the vividness of sensations; to him, also, *created* images have the coercive force of realities, excluding all control, all contradiction. What seems preposterous, impossible to us, seemed to him simple fact of observation. When he imagined a street, a house, a room, a figure, he saw it not in the vague schematic way of ordinary imagination, but in the sharp definition of actual perception, all the salient details obtruding themselves on his attention. He, seeing it thus vividly, made us also see it; and believing in its reality, however fantastic, he communicated something of his belief to us. He presented it in such relief that we ceased to think of it as a picture. So definite and insistent was the image, that even while knowing it was false, we

could not help, for a moment, being affected, as it were, by his hallucination.

This glorious energy of imagination is that which Dickens had in common with all great writers. It was this which made him a creator, and made his creations universally intelligible, no matter how fantastic and unreal. His types established themselves in the public mind like personal experiences. Their falsity was unnoticed in the blaze of their illumination. Every humbug seemed a Pecksniff, every nurse a Gamp, every jovial improvident a Micawber, every stunted serving-wench a marchioness. Universal experiences became individualized in these types; an image and a name were given, and the image was so suggestive that it seemed to *express* all that it was found to *recall*, and Dickens was held to have depicted what his readers supplied. Against such power criticism was almost idle. In vain critical reflection showed these figures to be merely masks—not characters, but personified characteristics, caricatures and distortions of human nature—the vividness of their presentation triumphed over reflection: their creator managed to communicate to the public his own unhesitating belief. Unreal and impossible as these types were, speaking a language never heard in life, moving, like pieces of simple mechanism, always in one way, (instead of moving with the infinite fluctuations of organisms, incalculable yet intelligible, surprising yet familiar,) these unreal figures affected the uncritical reader with the force of reality; and they did so in virtue of their embodiment of some real characteristic vividly presented. The imagination of the author laid hold of some well-marked physical trait, some peculiarity of aspect, speech or manner which every one recognized at once; and the force with which this was presented made it occupy the mind to the exclusion of all critical doubts: only reflection could detect the incongruity. Think of what this implies! Think how little the mass of men are given to reflect on their impressions, and how their minds are for the most part occupied with sensations rather than ideas, and you will see why Dickens held an undisputed sway. Give a child a wooden horse, with hair for mane and tail, and wafer spots for coloring, he will never be disturbed by the fact that this horse does not move its legs, but runs on wheels—the general suggestion suffices for his belief; and this wooden horse, which he can handle and draw, is believed in more than a pictured horse by a Wouvermanns or an Ansdell. It may be said of Dickens's human figures that they too are wooden, and run on wheels; but these are details which scarcely disturb the belief of admirers. Just as the wooden horse is brought within the range of the child's emotions, and dramatizing tendencies, when he can handle and draw it, so Dickens's figures are brought within the range of the reader's interests, and receive

from these interests a sudden illumination, when they are the puppets of a drama every incident of which appeals to the sympathies. With a fine felicity of instinct he seized upon situations having an irresistible hold over the domestic affections and ordinary sympathies. He spoke in the mother-tongue of the heart, and was always sure of ready listeners. He painted the life he knew—the life every one knew; for if the scenes and manners were unlike those we were familiar with, the feelings and motives, the joys and griefs, the mistakes and efforts of the actors were universal, and therefore universally intelligible; so that even critical spectators who complained that these broadly-painted pictures were artistic daubs, could not wholly resist their effective suggestiveness. He set in motion the secret springs of sympathy by touching the domestic affections. He painted nothing ideal, heroic; but all the resources of the bourgeois epic were in his grasp. The world of thought and passion lay beyond his horizon. But the joys and pains of childhood, the petty tyrannies of ignoble natures, the genial pleasantries of happy natures, the life of the poor, the struggles of the street and back parlor, the insolence of office, the sharp social contrasts, east-wind and Christmas jollity, hunger, misery, and hot punch—these he could deal with, so that we laughed and cried, were startled at the revelation of familiar facts hitherto unnoted, and felt our pulses quicken as we were hurried along with him in his fanciful flight. Such were the sources of his power.

Readers to whom all the refinements of art and literature are as meaningless hieroglyphs, were at once laid hold of by the reproduction of their own feelings, their own experiences, their own prejudices, in the irradiating splendor of his imagination; while readers whose cultivated sensibilities were alive to the most delicate and evanescent touches were, by virtue of their common nature, ready to be moved and delighted at his pictures and suggestions. The cultivated and uncultivated were affected by his admirable *mise en scène*, his fertile invention, his striking selection of incident, his intense vision of physical details. Only the cultivated who are made fastidious by cultivation paused to consider the pervading commonness of the works, and remarked that they are wholly without glimpses of a nobler life; and that the writer presents an almost unique example of a mind of singular force in which, so to speak, sensations never passed into ideas. Dickens sees and feels, but the logic of feeling seems the only logic he can manage. Thought is strangely absent from his works. I do not suppose a single thoughtful remark on life or character could be found throughout the twenty volumes. Not only is there a marked absence of the reflective tendency, but one sees no indication of the past life of humanity having ever occupied him;

keenly as he observes the objects before him, he never connects his observations into a general expression, never seems interested in the general relations of things. Compared with that of Fielding or Thackeray, his was merely an *animal* intelligence, *i.e.*, restricted to perceptions. On this ground his early education was more fruitful and less injurious than it would have been to a nature constructed on a more reflective and intellectual type. It furnished him with rare and valuable experience, early developed his sympathies with the lowly and struggling, and did not starve any intellectual ambition. He never was and never would have been a student.

My acquaintance with him began soon after the completion of *Pickwick*. Several years afterwards, in the course of a quiet chat over a cigar, we got on a subject which always interested him, on which he had stored many striking anecdotes—dreams. He then narrated, in his quietest and most impressive manner, that after his sister-in-law Mary's death, her image not only haunted him by day, but for twelve months visited his dreams every night. At first he had refrained from mentioning it to his wife; and after deferring this some time, felt unable to mention it to her. He had occasion to go to Liverpool, and as he went to bed that night there was a strong hope that the change of bed might break the spell of his dreams. It was not so, however. That night, as usual, the old dream was dreamt. He resolved to unburden his mind to his wife, and wrote that very morning a full account of his strange experience. From that time he ceased to dream of her. I forget whether he said he had never dreamt of her since; but I am certain of the fact that the spell had been broken then and there.

Here is another contribution to the subject of dreams, which I had from him shortly before his death. One night after one of his public readings, he dreamt that he was in a room where every one was dressed in scarlet. (The probable origin of this was the mass of scarlet opera-cloaks worn by the ladies among the audience, having left a sort of *afterglow* on his retina.) He stumbled against a lady standing with her back towards him. As he apologized she turned her head and said, quite unprovoked, "My name is Napier." The face was one perfectly unknown to him, nor did he know any one named Napier. Two days after he had another reading in the same town, and before it began a lady-friend came into the waiting room accompanied by an unknown lady in a scarlet opera-cloak, "who," said his friend, "is very desirous of being introduced." "Not Miss Napier?" he jokingly inquired. "Yes, Miss Napier." Although the face of his dream-lady was not the face of this Miss Napier, the coincidence of the scarlet cloak and the name was striking.

AMERICAN CRITICISM.

TO the old taunt that the English reviews were so fond of putting to us—"Who reads an American book?"—we have at last found the satisfactory answer—"Englishmen." The change that has been worked in the last decade in the English appreciation of American literature, as well as the most remarkable growth of that literature, is a curious example of how much the literary judgments by one nation of another depend upon the general reputation of the nation criticized. So little was known of this country before the war, even in the sacred limits of the heavy reviews, that the knowledge forced by the war upon the most unattentive spectator came like an inspiration. It had not been deemed worth while to study the manners or thought of a small provincial people. It was not thought odd that Mr. Dickens's journal should speak of Benjamin Franklin as one of the presidents of the United States, or that a well-known novelist should describe her heroine as standing on a levee at New Orleans and shivering in the bleak airs of Canada. If anyone knew these to be errors, they were thought too trivial to need correction, and far too natural to presuppose any ignorance on the part of their authors. And, indeed, such errors were trivial amongst a people that did not for the most know whether Poe, Longfellow, and Bryant were Englishmen or not. It would take a very large volume—library rather—to contain the blunders of English authors and journalists in respect of the United States; while the ignorance of the middle and upper classes as to everything connected with this country was so stupendous as to be well nigh incredible. An occasional sneer was the only notice we received from the more prominent reviews, and the others referred to us—as Punch was in the habit of doing—as strange, half-civilized savages who passed their time in flogging slaves or vending wooden nutmegs. Punch's well-known figure of Brother Jonathan was a long way in advance of the national idea of this country. It was confidently believed that all Americans were very tall, thin, sallow men, with lank hair worn long and striped breeches worn short, who spattered tobacco juice in all directions, whittled bits of wood incessantly, and always sat in a posture that brought the feet on a higher level than the head. Of course these creatures talked through their noses; and as it was impossible to suppose they could speak the English language, a dialect was invented for them as appropriate for the imaginary creatures, as it was totally unspoken outside of England. Then the popular mind

having attained this clear and satisfactory conception of the American character rested from its labors, and suffered nothing to alter the picture itself had so carefully, so accurately painted.

All this was swept away by the war. As soon as the magnitude of our resources and the steadfastness of our nationality began to be realized; when the world saw that America was not a handful of petty States, but a connected, closely-knit organism, capable of sustaining a protracted war conducted upon what was then an unparalleled scale; of putting a million of armed men in the field and maintaining them there; of building a navy so powerful in degree, so novel in kind, that Europe was forced to burn her fleets and build copies of ours; and of doing this with unimpaired resources and unaffected credit, so that we could show a treasury surplus larger than that of any nation in the world—*then* it was thought not unbecoming for Englishmen to gather a little information as to a people that was, although barbarian, powerful. And to do them justice they have discovered a vast deal—much that they should have known long before, and much that in point of fact does not exist at all. Not only do Englishmen answer their old conundrum—Who reads American books? by themselves reading them—but they have given rank to some of the least known, and least worthy to be known, of American authors. It is admitted at last that we have done something in literature; that we have written some true poetry and good essays, and standard histories; that Edgar Poe, Bryant, Halleck, Longfellow, and Holmes—that Emerson, Lowell, Whipple, Curtis, and dear old Washington Irving—Prescott, Bancroft, Motley, do not compare altogether unfavorably with their English cotemporaries. Indeed, our new admirers do not stop here: they insist upon wreathing the bays of immortality upon the brows of Joaquin Miller and Walt Whitman. In one department of literature—that of the humorists—they kindly yield us the palm. Aytoun and Leech, widely dissimilar as they were, represented alone the modern English school of humorists; and they have nothing, they confess, to answer to our Artemas Ward, Lieut. Derby, Orpheus C. Kerr, Holmes, Bret Harte, Nasby, and Hosea Biglow. Of course, all true Americans knew this; for one of the most patent individualities of our national character is that subtle sense of the ridiculous, of which our English cousins have only a modified appreciation. As a nation we are not witty. Our dinner-table talk is inferior both to that of the Italians and their superiors the French; but it is ineffably better than that of the English, than which nothing more deplorable can be imagined. . An Italian who chances upon a clever saying—a fine word—repeats it instantly to his entire acquaintance. A Frenchman, after announcing his authorship of it, rushes with it to a printing-office, where

he hopes to render it immortal. An American says it and forgets it. An Englishman never says it at all. In satire he is terrific; in wit he is a minus quantity, as the mathematicians say.

Now, the English fully admit our claims as humorists, as well as our claim to have begun a literature that is at least worth studying, but they fall back upon the absence amongst us of any true criticism. "There are no critics in America" is the solemn burden of the cry from over the water. "You can write books, but you cannot criticize them." It must be confessed that our English cousins have managed this time to reach one of our weakest parts, and their shafts quiver there in a very uncomfortable manner; for, if true, nothing could more clearly demonstrate that we have no real abiding literature. However brilliant may be the authors or artists of a nation, there cannot be either literature or art without competent criticism, which, indeed, is to them what air is to the lungs: and unless we can produce some home criticism we shall be forced to leave our cousins in possession of the field. At the outset it must be admitted that American criticism is far from what it should be; and that bad and deficient as it has been in the past, there are no very cheering signs of its amelioration in the future. There are several reasons for this. One, and an important one, is the absence of that class that so holds up the character of English thought in all departments—the fellows of the universities—men who, having won the honors of their *alma mater*, are enabled by her generosity to devote themselves to any work they may select, freed from all necessity for pecuniary care. From this class comes the careful taste that is continually at work in England, purifying, sweetening her literature, and guiding the popular feeling into sympathy with it. There are no fellowships in American universities. Should a graduate be willing to devote some years—the best years of his life—to general study, he can only do so in the event of his being a man of fortune. If he is poor—and nine out of every ten American students are poor—he is forced to attempt to continue his education whilst supporting himself by outside work, or else give himself up entirely to the race for wealth. It is quite true that the revenues of our colleges are much too small to support regular fellowships; but if the colleges of each State in the Union were aggregated into a single State university, its consolidated income would be amply sufficient. The present American notion of a university is very amusing. It seems to be fancied that you can found one as you build a house or a ship, and stock it with professors as you would the house with upholstery or the ship with tackle. Almost every very rich man now-a-days starts a university just as he starts a carriage, and the land is covered over with weak and wretched little colleges that are little else than nuisances to

the community and crumbling monuments of the misguided charity of their founders. Universities are not made—they grow. It is in the strength of her memories, her traditions, the names of her successful children—in the close friendship and endearing respect that she has given her from generation to generation, that a college lives. It is not a mechanism, but a human organization that needs time to develop in, and a rich, hearty, generous life poured into its veins, and to be filled with tender memories and the recollections of great triumphs; it needs to be something more than a mass of buildings and crowd of professors; it must be to every true-minded student a bright, sweet picture of his dream of greatness—a fair being with something of the glory and tenderness of a mother's love. This may seem exaggerated and sentimental, but it is not. It is the first shaping of that enthusiasm that has always been recognized as one of the powers of society, and he is an unfortunate man who cannot remember a time when his *alma mater* did in verity seem to be a mother to his mind and his affections.

It may possibly seem as if the constitution of universities were a subject rather remote from the consideration of American criticism. In point of fact it is most intimately connected with it; for it is in our universities that all criticism is born. With or without culture, a man of great powers may make his name famous: but no natural genius is sufficient to make a true critic. The mere examination of the material upon which the judgment is to be exercised demands a careful training and accurate habits of thought, and the one most essential qualification of a critic is *culture* in its highest and broadest sense. Now, as this is necessarily acquired for the most part in universities, and as the habit of valuing, as it were, the works of others can never be found to any appreciable extent except amongst students or professional literary men, it is apparent that the education afforded by our colleges bears directly upon the national criticism. And one step further: inasmuch as that education is necessarily primary, and the graduation of the majority of American students is at an age when the mind is just beginning to mature, it is equally apparent that some opportunity should be offered to a student by which success in his class would secure him such a livelihood as would enable him to carry his education to still higher levels. Probably nothing would so advance the tone of our criticism and of the public estimate of the literature of the day as the founding upon a generous basis of fellowships on the English plan. Another misfortune under which American criticism labors is the frequent control of American magazines by firms who publish the books criticized. It is not perhaps a great evil, but the tendency of the system is bad. The English reviews represent political or church parties, and as such review

the same books from widely different standpoints. Of course it would be better were the critic unbound by any ties to church or party, but at least he represents the views of a class, and not the interests of the firm who publish his criticism.

We have spoken of American criticism as deficient and weak, and it is so relatively to the strength of the work we have done in other directions; but it would be unjust not to qualify the condemnation by a recognition of the admirable criticisms that we occasionally have had. As an instance, those of Mr. Lowell on Dryden and Chaucer are unsurpassed in delicacy of touch and perfection of finish. And if some of our criticisms are a trifle crude, it must not be forgotten that the great Jeffrey, whose nod was that of Jove, fell into more absurdities than would suffice to have ruined any ordinary reputation. It seems almost incredible to believe, but it is none the less the fact, that he valued Keats very low, and laughed at Wordsworth, of whom his criticism reminds one of, and is nearly as bad as that of Dr. Johnson on Hamlet, in which the worthy doctor, who knew as little of Shakspeare as of good manners, says: "This play is very diversified, and the pretended madness of Hamlet causes much mirth." Of Coleridge and Shelley, Lord Jeffrey takes no note, but sings his loudest praises to one "Crabbe," whom he declares to be the great poet of his age, and who is now as little read as any scribbler who ever had the misfortune to get into print.

All that we need is to have a larger share of encouragement given to those who are willing to essay the difficult path of criticism. We must be prepared to sow *culture* with a liberal hand if we hope to reap its fruits, and remember that the possession of a school of able and just critics is at once the best evidence of the high civilization of a country, and its best aid to the establishment of an enduring and great literature. We know enough of the American mind to know that it is distinctive and original enough—has sufficient breadth and strength of grasp, and fertility and delicacy of imagination, to entitle it to a literature of its own. Nay—it has already won an honorable name in the world of letters. The world is glad to read American books. Can we not make it equally glad to read American criticisms?

THE SOCIAL ADJUSTMENT OF INDIVIDUAL DIVERGENCES.

THE theory of the causality and regularity of personal actions, best known from the comprehensive statement of Mr. Buckle, originates as a scientific exposition in the evidence afforded by the statistics and researches of Quetelet. It is well to note, as something of a guide and warning in the resulting enquiry, that Buckle and Quetelet reach somewhat different propositions when building upon a like basis.

Buckle finds his solution by simply discarding the idea that human action "depends on some capricious and personal principle peculiar to each man, as free-will or the like;" contrary to this, he asserts "that the actions of men, being guided by their antecedents, are in reality never inconsistent, but, however capricious they may appear, only form part of one vast scheme of universal order, of which we, in the present state of knowledge, can barely see the outline." M. Quetelet's argument from the same evidence differs remarkably from this. His expedient for accounting for the regularity of social events, without throwing over the notion of arbitrary action, is to admit the existence of free-will, but to confine its effects within very narrow bounds. He holds that arbitrary will does not act beyond the limits at which science begins, and that its effects, though apparently so great, may, if taken collectively, be reckoned as null, experience proving that individual wills are neutralized in the midst of general wills. Individual purposes, though of sufficient diversity to prevent our predicting the actions of the individual, disappear in the collective action of large bodies of men, which results from general social laws, which can accordingly be predicted like other results regulated by natural laws. We may, says E. B. Tylor, whom we quote, perhaps apprehend the meaning of Quetelet's views more clearly from another passage, where, to show how apparently isolated events may be really connected under some wide law, he compares single facts to a number of scattered points, which seem not related to one another till the observer, commanding a view of a series of them from a distance, loses sight of their little accidents of arrangement, and at the same time perceives that they are really arranged along a connecting curve. Then the writer goes on to imagine, still more suggestively, that these points might actually be tiny animated creatures, capable of free action within a very narrow range, while nevertheless their spontaneous movements would not be discernible from a distance where only their laws of mutual

relation would appear. M. Quetelet can thus conciliate received opinions by recognizing the doctrine of arbitrary volition, while depriving it of disorganizing power.

To those who accept the extreme principle that similar men under similar circumstances must necessarily do similar acts; and to those, also, who adopt the notion of free-will as a small disturbing cause which disappears in the large result of social law, the regularity of civilized life carries its own explanation. Society is roughly homogeneous from year to year. Individuals are born, pass on through stage after stage of life, and die; but at each move one drops into another's place, and the shifting of individuals only brings change into the social system, so far as those great general causes have been at work which difference one age from another—the introduction of different knowledge, different principles, different arts, different industrial materials and outlets. The modern sociologist, whatever his metaphysical prepossessions, looks at society as a system amenable to direct cause and effect. To a great extent his accurate reckonings serve to give more force and point to the conclusions of rough experience; to a great extent, also, they correct old ideas and introduce new aspects of social law. What gives to the statistical method its greatest scope and power is, that its evidence and proof of law applies indiscriminately to what we call physical, biological, and ethical products of society, these various effects acting and reacting on one another. Thus, for instance, the mode of life affects its length. The mortality of the very poor is about half as much again as the mortality of the very rich; while, as to the influence of professions, it appears that, in Germany, only 24 doctors reach the age of 70 as against 32 military men and 42 theologians. The propensity to theft bears a distinct relation to age; thus the French criminal statistics estimate the propensity to theft between the ages of 21 and 25 as being five-thirds as much as between the ages of 35 and 40. The amount of criminality in a country bears a relation indirect, and as yet obscure, but unmistakable, to its education, or rather to its want of education. In France, in 1828–31, the constant percentage of accused persons was about as follows: could not read or write, 61; imperfectly, 27; well, 12. The comparison of this group of numbers with those taken lately in England shows a great change of proportion, evidently resulting from the wider diffusion of education; but the limitation of crime to the less-educated classes is even more striking: cannot read or write, 36; imperfectly, 61; well, 3. Again, for an example of connection of physical conditions with moral actions, we may notice a table showing how the hours of the day influence people who hang themselves. The maximum of such cases, 135, occurred between six and eight in the

morning; the number decreased slightly till noon, and then suddenly dropped to the minimum; there being 123 cases between ten and twelve o'clock, against only 32 between twelve and two o'clock. The number rose in the afternoon to 104 cases between four and six, dropping to an average of about 70 through the night; the second minimum, 45, being between two and four o'clock in the morning. Here it is impossible to mistake the influences of the periods of the day. We can fancy we see the poor wretches rising in the morning to a life of which the misery is beyond bearing, or can only be borne till evening closes in; while the temporary relief of the midnight sleep and the mid-day meal are marked in holding back the longing to self-destruction. Madness varies with the season of the year: the maximum being in summer, and the minimum in winter, a state of things which seems intelligible enough. Again, it is well known in current opinion that more children are born in the night than in the day; in fact, there are about five night-born against four day-born, the maximum being about midnight, the minimum a little before noon. Why this is, no one yet knows; it is a case of unexplained law. But another not less curious law relating to births seems to have been at last successfully unravelled. In Europe about 106 boys are born to every 100 girls. The explanation appears to depend on the husband being older than the wife; which difference again is regulated by prudential considerations, a man not marrying till he can maintain a wife. In connection with this argument, it must be noticed that illegitimate births show a much less excess of male children. Here, then, (if this explanation may be accepted,) it appears that a law, which has been supposed to be due to purely physiological causes, is traceable to an ultimate origin in political economy.

The examples brought forward by Quetelet, which thus show the intimate relation between biological and ethical phenomena, should be pondered by all who take an interest in that great movement of our time—the introduction of scientific evidence into problems over which theologians and moralists have long claimed exclusive jurisdiction. This scientific invasion consists mainly in application of exact evidence in place of inexact evidence, and of proof in place of sentiment and authority. Already the result of the introduction of statistics into inquiries of this kind appears in new adjustments of the frontier line between right and wrong, as measured under our modern social conditions. Take, for instance, the case of foundling hospitals, which provide a “tour,” or other means, for the secret reception of infants abandoned by their parents. It has seemed, and still seems, to many estimable persons, an act of benevolence to found and maintain such institutions.

But, when their operation comes to be studied by statisticians, they are found to produce an enormous increase in the number of exposed illegitimate children. In fact, thus to facilitate the safe and secret abandonment of children is to set a powerful engine at work to demoralize society. Here, then, a particular class of charitable actions has been removed, by the statistical study of its effects, from the category of virtuous into that of vicious actions. An even more important transition of the same kind is taking place in the estimation of alms-giving from the ethical point of view. Until modern ages, through all the countries of higher civilization, men have been urged by their teachers of morality to give to the poor, worthy or unworthy; the state of public opinion being well exemplified by the narrowing of the word "charity" from its original sense to denote the distribution of doles. Yet, when the statistics of pauperism were collected and studied, it was shown that indiscriminate alms-giving is an action rather evil than good, its tendency being not only to maintain, but actually to produce idle paupers. In our time a large proportion of the public and private funds, distributed among the poor, is spent in actually diminishing their industry, frugality, and self-reliance. Yet the evil of indiscriminate alms-giving is diminishing under the influence of sounder knowledge of social laws, and genuine charity is more and more directed by careful study of the means by which wealth may be spent for the distinct benefit of society. Such examples as these show clearly the imperfection and untrustworthiness of traditional, or what is called intuitive morality, in deciding on questions of right and wrong, and the necessity of appealing in all cases to the best attainable information of social science to decide what actions are really for or against the general good, and are therefore to be classed as virtuous or vicious.*

Moreover, it is not too much to say that the comparatively small

* People, says Herbert Spencer, who think that the relations between expenditure and production are so simple, naturally assume simplicity in other relations among social phenomena. Is there distress somewhere? They suppose nothing more is required than to subscribe money for relieving it. On the one hand, they never trace the reactive effects which charitable donations work on bank accounts, on the surplus capital bankers have to lend, on the productive activity which the capital now abstracted would have set up, on the number of laborers who would have received wages and who now go without wages; they do not perceive that certain necessities of life have been withheld from one man who would have exchanged useful work for them, and given to another who perhaps persistently evades working. Nor, on the other hand, do they look beyond the immediate mitigation of misery; but deliberately shut their eyes to the fact that as fast as you increase the provision for those who live without labor, so fast do you increase the number of those who live without labor; and that, with an ever-increasing distribution of alms there comes an ever-increasing cry for more alms. Similarly throughout all their political thinking. Proximate causes and proximate results are alone contemplated; and there is scarcely any consciousness that the original causes are often numerous and widely different from the apparent cause, and that beyond each immediate result there will be multitudinous remote results, most of them quite incalculable.

advance which moral science has made, since barbaric ages, has been due to the repugnance of moralists to admit, in human action, the regular causality which is the admitted principle of other parts of the action of the universe. The idea of the influence of the arbitrary will in the individual man has checked and opposed the calculations which now display the paramount action of society as an organized whole. One point in M. Quetelet's doctrine of society requires a mention for its practical bearing on morals. There has seemed to some to be an immoral tendency in his principle that virtuous and vicious acts are products not merely of the individual who does them, but of the society in which they take place, as though the tendency of this view were to weaken individual responsibility and to discourage individual effort. Yet, when properly understood, this principle offers a more strong and definite impulse to the effort of society for good and against evil, than the theory which refers the individual's action more exclusively to himself. M. Quetelet's inference from the regular production of a certain amount of crime year by year, from a society in a certain condition, is embodied in his maxim that society prepares the crime and the criminal executes it. So every member of society who offers a facility to the commission of crime is, in a degree, responsible for it. It is superficial to suppose that the crimes in great cities are attributable altogether to the free agency of the poor wretches who are imprisoned or hanged for them. The nation which promotes the existence of a criminal class is responsible collectively for the evil done by this class. This we can see plainly enough, although the exact distribution of the responsibility among the different members of society may be impossible to determine. Such a theory, of course, casts aside the revenge theory of criminal law, assimilating the treatment of criminals to the operation of a surgeon healing a diseased part of the body, if possible, or, if not, rendering it harmless or removing it.

In so far as any classes of persons shape the existing conditions of society, they cannot escape the moral blame which inculcates them as sharers in the crimes resulting from that deleterious state of society which is avoidable. Thus the doctrine that the nation is responsible for the acts of its individual members—for the results reach all—is one which widens the range of personal interest to the utmost. The labors of M. Quetelet, in reducing to absolute calculation this doctrine of the solidarity of human society, entitle him to a place among those great thinkers whose efforts perceptibly raise that society to a higher intellectual and moral level. Here, as everywhere, the larger comprehension of the laws of nature works for good and not for evil. The incapacity of the State to suppress individual crime has been manifest enough all

along the past. We might say that there has been involuntary guilt on its part; but the resources of advancing thought not disregarded, reformatory measures may be devised, which, altering the present moral status of society, will reduce annual ratio of crime to a small percentage of present amount.

MARTINEAU ON MIND IN EVOLUTION.

ILLUSTRATIVE EXTRACTS.

In dealing with these three conceptions—Creation, Construction, Evolution,—there is one thing on which religion insists, viz., that *Mind is first, and rules forever*; and whatever the process be, is *its* process, moving towards congenial ends. Let this be granted, and it matters not by what path of method the Divine thought advances, or how long it is upon the road.

Nothing can be evolved that is not *first* involved.

Evolution undertakes with a minimum of initial capacity to account for the maximum of human genius and character.

The conditions which give the first type of force do not suffice to promote it to the second; you must enlarge its capital and present it with an outfit of heterogeneous constituents, but with all your enlargements of data, the door of life is closed still. If we make you a present of the third phase of power, and place at your disposal all that is contained beneath and within the flora of the world, you cannot take a single step towards the deduction of sensation and thought. Neither at the upper limit do the highest plants (the exogens) transcend themselves and overbalance into animal existence; nor at the lower, grope as you may among the sea-weed and sponges, can you persuade the sporules of the one to develop into the other.

It is not true that in virtue of the convertibility of force, that the possession of any is the possession of the whole—we give you all forms but one, and that one remains inaccessible.

Before one force can exchange with another, both must be there.

If all force is to be conceived as one, its type must be looked for in the highest and all-comprehending term, and mind must be there.

Within the limits of her physics and chemistry alone, nature discloses no principle of progression, but only provisions for periodicity.

The law of natural selection testifies to a constitution of the world prearranged for progress.

Competition is the real dynamics of evolution. Competition accounts for the survivorship of the better, but not for there being a better to survive.

Below the level of life there is no room for the operation of natural selection; its place there is occupied by another principle—the dynamic rule—action on the line of least resistance, which works not towards more complex, but towards simpler unions.

Purpose is ulterior end. Under the tension of a directing mental interest, whether supplied by the animal's own instincts, or by the controlling care of man, the organism yields itself to be moulded into more special and highly finished forms; and a series of ascending variations withdraws the nature from its original or first-known type. But where ever we can lift the tension off, the too skilful balance proves unstable, and the law of reversion reinstates the simpler conditions.

Evolution and propection are inseparable conceptions. Go back as you will, and try to propel the movement from behind, instead of drawing it from before, development in a definite direction towards the realization of a dominant scheme of ascending relations is the sway of an overruling end.

The Divine idea sustains the higher equilibrium, which else would lapse into lower forms.

The purity of intuitions is not pristine, but ultimate.

If, to find the functions of our higher faculties we must look to their last stage and not to their first, we at once recover and justify the ideal conceptions which the expositors of evolution are accustomed to disparage as romance. For among these functions are present certain intuitive beliefs—for the reason, in Divine causality; for the conscience, in Divine authority; together blending into the knowledge of a Supreme and Holy Mind. These august apprehensions, we are entitled to declare, are not the illusions, but the discoveries of man, who, by rising into them, is born into more of the universe of things than any other being upon earth, and is made conscious of its transcendent and ultimate realities. If these trusts are indeed the growth of ages, from seeds invisibly dropped upon the field of time, be it so; it was not without hand: there was a *Sower* that went forth to sow.

MINING AND METALLURGY.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Del.]

IN modern metallurgical processes the tendency of invention is towards economy of fuel and labor, and an acceleration of the operation as a whole. Mr. Bessemer has furnished a striking example of improvements in this direction, the practical importance of which has been demonstrated by the rapid adoption of his process in all countries where iron is a prominent product. In the same general line of invention may be mentioned the process of Mr. Siemens, more recently introduced than Bessemer's, and which has been, as yet, adopted to only a limited extent; but which, according to some authorities, is destined to absorb no small share of attention from iron metallurgists. This process has been in successful operation for nearly three years at the Landore steel works, on the bank of the river Tawy, near Swansea, in Wales; and that the scale upon which it has been tested is one of some magnitude may be inferred from the fact that about four hundred men are constantly employed in the works, which cover six acres of ground. Fifty-two Siemens gas producers, a melting-shop containing eight furnaces, and a forge department containing two eight-ton hammers, form part of the plant. There are also in the works six double puddling furnaces with shingling hammer, and a mill driven by two thirty-inch cylinder engines with Ramsbottom's reversing gear. Four blast furnaces are being erected for the manufacture of pig-metal. Sixteen melting furnaces will be built, and five additional eight-ton hammers are projected. Spanish ores will be chiefly used. According to an account of these works in a foreign journal, the fifty-two Siemens gas producers are arranged in thirteen blocks of four each. The gas is divided into two portions, one of which is conveyed to the melting and puddling furnaces, another portion being conducted by a second large tube to other melting furnaces, and to the heating furnaces for the mill and hammer. The coal used in the manufacture of the gas is obtained from the neighborhood, and consists of equal parts of "slack" of small coal and binding coal.

Of the eight furnaces in the melting shop four are used for melting scrap, of which about sixty-two tons per week are melted in each furnace, which work about thirteen heats each per week. Pig-iron is first charged in, and then a sufficient quantity of scrap to reduce the amount of carbon in the metal. One of the peculiarities of the process is that the carbon is slowly "boiled away," and when this has become eliminated, spiegel-eisen is added, after which the furnace is quickly tapped. A fair sample of an ordinary charge is given as follows:—

Pig-iron.....	20	per cent.
Bessemer scrap.....	20	"
Rough puddled iron.....	10	"
Siemens scrap.....	15	"
Old iron and borings.....	15	"
Shearings.....	20	"

To the above about seven and a half per cent. of spiegeleisen is added. From time to time a small quantity of the liquid metal is withdrawn in a ladle and plunged into cold water. The cooled sample is then broken on an anvil and its fracture examined, by which some idea of the amount of carbon present may be obtained. Toughness and malleability are qualities which are desired, and if these properties are shown, a further addition of spiegeleisen is thrown in through the charging doors and allowed to melt upon the bath. If too much carbon is revealed by testing the sample, it is allowed to "boil out"; but as this consumes time, if the capacity of the furnace allows it, more decarburized iron is added, which serves to reduce the proportion. The operation occupies, on an average, seven or eight hours. When it is completed the metal is tapped out of the furnace into a ladle, and then run into ingots. The Siemens steel furnace is thus described: "The direction of the flame is from end to end, and the regenerators are placed transversely below the bed, which is supported on iron plates kept cool by a current of air. This cooling of the bed is necessary to keep the slag or melted metal from finding its way through into the regenerator or chambers. The bottom of the furnace is formed of siliceous sand. Instead of putting moist sand into the cold furnace, Mr. Siemens calcines the sand and introduces it into the hot furnace in layers of about one inch in thickness. The heat of the furnace must be sufficient to fuse the surface of each layer; that is to say, it must exceed a welding heat at the end of the operation in order to impart additional solidity to the uppermost layers. Care must be taken that the surface of the bath assumes the form of a shallow basin, being deepest near the tap-hole. Some white sand will set under these circumstances into a hard, impervious crust, capable of surviving from twenty to thirty charges of liquid steel without requiring material repair." The sand best adapted for the purpose contains about ninety-six per cent. of silica and four per cent. of alumina or magnesia.

The difference between the process of Siemens and that of Bessemer is, that by the former the metal is kept for any length of time slowly simmering in a state of fusion; so that by the addition of varying proportions of the ingredients it is claimed that steel of any temper can be made, while the process is so completely under control that steel containing any desired quantity of carbon may be produced at will. Whether these claims can be fully realized yet remains to be seen; but it is said that at the Landore works the process has proved an entire success.

—PLATINUM, which is now so indispensable in the laboratory of the chemist, is still found in such limited quantities as to cause it to be classified among the rare metals. Discovered in South America as long ago as 1736, it remained an almost useless substance until Wollaston devised a method for isolating it from its associated metals by the wet process of solution in nitro-muriatic acid, precipitation by means of chloride of ammonium, and subsequent ignition of the ammonio-chloride of platinum, whereby the metal in a state of fine black powder is obtained. Berzelius and Vanquelin have contributed not a little to the knowledge we possess of platinum in its chemical relations; and since their time Deville and Debray have perfected a process by which it is refined in a manner more nearly approaching to the metallurgical treatment of other ores. The very infusibility of this metal—a quality which gives it its chief value—presented difficulties in the way of its reduction which retarded its application in the arts.

Platinum occurs more abundantly in the Ural mountains, in Russia, than in any other part of the world, although it is found on the western slope of the Andes in South America, in Brazil, in California, and in very minute quantities in France, Spain, and Germany. It is likewise found in the island of Borneo, and in the Burman empire. Small scales and grains of platinum have been discovered in Canada, and a few grains have been found associated with gold in Rutherford and Burke counties, in North Carolina. The principal source of supply, however, is Russia, where, excepting in one locality, it is always obtained from placer gold in the Urals. It is separated from the

latter metal by treatment with mercury, which amalgamates with the gold, leaving the platinum untouched. After the larger pieces of gold or silver have been picked out from the product of the washings, ten to twenty-five pounds of the residue are placed in a pan constructed either of wood, iron, or porcelain, and thoroughly washed with water, after which a suitable quantity of mercury is added. The amalgam is strained through a bag, the mercury which runs through is returned to the pan, and the operation is repeated until no more gold can be seen in the residue. The amalgam is then distilled in the usual manner for the gold it contains, while the residue, consisting of about seventy-five per cent. of platinum, finds a market in England and France. From 1828 to 1845 platinum coins were common in Russia, but owing to a decline in the value of the metal their production ceased in the latter year, at which time the annual yield of platinum was 5,247 pounds. It is now about 4,000 pounds.

Le Play reports the average composition of the platinum shipped from Tagilsk to be as follows:—

Platinum	75.1
Palladium.....	1.1
Rhodium	8.5
Iridium.....	2.6
Osmium-Iridium .....	.6
Osmium.....	2.3
Gold .....	.4
Copper	1.0
Iron	8.1
Residue	4.5
	<hr/> 99.2

—FROM the statistics of the Mining Record Office of Great Britain and Ireland we learn that the mineral product of the United Kingdom for the year 1870 was as follows:—

Article.	Amount.	Value.
Coal	110,481,192 tons.	£27,607,798
Iron ore.....	14,870,654 "	4,951,220
Copper ore	106,698 "	437,891
Tin ore.....	15,285 "	1,002,527
Lead ore.....	98,176 "	1,200,200
Zinc ore.....	13,586 "	41,000
Iron pyrites (sulphur ore).....	58,428 "	86,086
Arsenic.....	4,050 "	17,739
Gossans, ochres, &c.....	4,844 "	4,261
Wolfram and tungstate of soda.....	51 "	653
Manganese	4,888 "	19,499
Nickel.....	1 "	27
Barytes.....	6,515 "	2,771
Clays, fire and fire (estimated).....	1,200,000 "	450,000
Earthy minerals, various (estimated).....		575,000
Salt.....	1,489,450 "	744,725
Coprolites (estimated).....	85,000 "	58,000
Total value.....		<hr/> £37,142,194

The quantity of metal obtained from the ores above enumerated was:—

	Amount.	Value.
Pig-iron.....	5,968,515 tons.	£14,908,787
Tin.....	10,200 "	1,299,505
Copper.....	7,175 "	551,309
Lead.....	73,420 "	1,452,715
Zinc.....	8,986 "	74,096
Silver.....	784,562 ounces.	196,140
Gold.....	191 "	750
Total value.....		<hr/> £18,486,802

The total value of the metals and coal, with other minerals which are not smelted—excepting building stones, lime, slates, and common clays—produced in the United Kingdom during 1870 was:—

Metals	£18,486,803
Coal.....	27,607,798
Other minerals.....	1,851,700
Total value.....	£47,946,346

—No stronger argument in favor of State geological surveys can be given than is afforded by an examination of such reports as that about being issued by Prof. Cox, State geologist of Indiana. Private reports have been made from time to time upon isolated tracts of mining land, rumors of a more or less reliable character have been circulated regarding the mineral wealth of detached portions the State, and a tolerably clear idea has prevailed to the effect that coal and valuable ores exist in abundance; but in the absence of a complete and elaborate survey no definite conclusions regarding the extent and boundaries of the coal fields of the State could be entertained, and the information possessed on the subject was mainly conjectural. The report in question conveys a very clear impression of these important coal fields, and determines their extent with some degree of exactness. According to Prof. Cox, there are in Indiana two well-defined zones of coal, called respectively the eastern and western zones. The former is 150 miles in length, with an average width of three miles, having an area of 450 square miles, or 288,000 acres. The included coals belong to the non-bituminous variety, characterized as *non-caking* or *free-burning* coals. But while this feature is common to the cherry coals of England, there is a difference in physical structure between the non-caking coals of Indiana and the English and a similar class of coals found in the Mahoning valley of Ohio, and the Shenango valley of Pennsylvania—the latter two being the only other localities in the United States where any important deposits of non-caking coal have been found. In the block-coal zone of Indiana there are eight seams of non caking coal, four of which are of good workable thickness over a portion of the field, having together a maximum thickness of fifteen feet, which, by including the other four seams, adds six feet more, making a total of twenty-one feet of block coal. Taking one-half of this as a moderate average over the 288,000 acres comprised within this zone, it will give 5,289,017,600 tons of coal adapted to the smelting of iron, which will produce at the rate of \$2.25 per ton—the average price of this coal at Brazil—the sum of \$11,855,289,600, and this estimated value Prof. Cox believes to be within bounds.

We have before alluded to the great excellence of the block coal in metallurgical operations. Pig-iron made with it is declared by experts to be equal to charcoal iron made from the same ores. It is a soft gray iron of a highly crystalline structure, containing a large percentage of combined carbon with but a trace of sulphur or phosphorus, and because of its purity it is admirably adapted to the manufacture of Bessemer steel. As a fuel for manufacturing and domestic purposes the block coal is pronounced to be unsurpassed. It burns freely, makes no clinker, contains but 4½ per cent. of ash, and on account of its freedom from sulphur, boilers, grates, and fire-boxes are uninjured.

—MECHANICAL puddling has been for many years regarded as a desideratum by iron-masters, but its realization has but recently seemed attainable. Mr. Danks has apparently achieved a success in this line of invention, while in England the Spencer process is described as having genuine merit. According to accounts which we have, this invention relates chiefly to the construction of the interior and the material used for lining the revolving furnaces. A transverse section of the furnace reveals a polygonal shape, by which the molten metal is more thoroughly agitated than if the interior were cylindrical. By a peculiar construction of the sides, which are honeycombed—the openings extending to the outsides—the lining is held in a very effectual manner. The sides of the

furnace are lined with oxide of iron, with mill-furnace cinder or ball-furnace tap, which is run into the interior in a molten condition. In lining the bottoms of ordinary puddling furnaces, a quantity of wrought-iron scrap is placed on the plates—which are plain—when the fire is urged so as to convert as much of the scrap as possible into an oxide of iron, allowing the oxide to settle down on the bottom plates, and thus form the lining, from which any unmelted scrap is carefully removed. To line the sides, end, and roof, fire-bricks and other well known materials are employed. It would be impossible to line a revolving furnace by this process, as the top and sides would melt down before the wrought-iron scrap would be melted on the bottom. In accordance with Mr. Spencer's invention the oxide is melted in another furnace, and then run into the revolving furnace, which by alternately lowering each side of the polygon allows it to set before another side is lined. The cellular or honeycombed construction of the sides affords spaces by which the lining may be held securely in its place.

In using these improved furnaces, or converters, the iron to be heated is introduced into the converter in a molten state, the charging holes are closed, and the converter revolved by suitable gearing. By means of its flat sides the iron will be thoroughly agitated, and after the required time, which may be ascertained by looking through a "spy-hole," it will assume a granular form and commence to ball. The doors are then opened, and the ball or balls are withdrawn and conveyed to the hammer.

—A VERY complete and elaborate tabular statement of the copper and iron business of Lake Superior from 1845 to December 31, 1871, has been issued from the office of the Portage Lake Mining Gazette. As we have already quoted from this paper (which, by the way, is one of the best of our exchanges) the figures showing the production of copper and iron during 1871, we will not reproduce them here; but there are other facts which possess a general interest. The total copper product during the twenty-six years embraced in the report has been 160,529 tons, from which have been smelted 125,243 tons of ingot copper, valued at \$68,528,600. The total amount of assessments levied, as nearly as can be ascertained, since the commencement of operations in 1845, amount to \$17,106,500, contributed by one hundred and twelve companies; while the total amount of dividends declared during the same interval were \$8,680,000, contributed by ten companies, the Calumet and Hecla—which are now consolidated—heading the list with a total of \$2,050,000, while the Copper Falls brings up the rear with a total of \$100,000. The general results of copper mining on the lake are stated as follows:—

Proceeds from sales of copper.....	\$68,528,600
" " assessments.....	17,106,500
Total proceeds.....	\$85,635,100
Returned by dividends.....	8,680,000
Balance.....	\$76,955,100
Percentage of dividends to total proceeds.....	10.13 per cent.
" " " " copper sales.....	12.66 "
" " " " assessments.....	50.74 "

In the iron region of Lake Superior, since mining commenced in 1856, the quantity of ore raised has shown a rapid increase, reaching a total of 4,582,074 tons. Of this a very large proportion has been shipped. The amount of pig-iron made has risen from 1,639 tons in 1858 to 51,225 tons in 1871, the total amount produced in the interval being 290,335 tons. The gross value of the iron product—including both ore and metal—is \$33,813,249.

—On account of its hardness corundum is a mineral much used for cutting and polishing hard surfaces, and in varying degrees of fineness it is indispensable in many of the arts. It has been long known to exist in North Carolina, in the vicinity of Franklin, Macon county. It has been likewise found in Madison and Gaston counties, but hitherto

no systematic explorations of the deposits have been made, nor has the mineral been sought for by any organized mining operations. It has been heretofore observed chiefly in the form of boulders and detached pieces. Within a short time, however, Col. C. W. Jenks has traced these masses to their source, where the mineral has been discovered to exist in veins in the Blue Ridge mountains, about 2,500 feet above the level of the sea. The principal vein, which attains a width of about four feet, and a north-easterly bearing, is composed of crystalline masses and crystals of various colors, the predominant tints being blue, grayish-white, and red. Crystals of chlorite accompany the corundum, and the former mineral—which is probably the *corundophilite* of Shepard—is found on either side of the vein. Six additional veins have been examined by Col. Jenks, in one of which the corundum is said to occur alone, while in others chlorite, tourmaline, feldspar, and mica are freely disseminated. A greenish-black variety of spinel, occurring both in disseminated grains and in octahedral crystals, is found in one of the veins, while in another zircons are abundant. Talcose schists and serpentine are common in the mountain. The crystals of corundum found in this locality vary in size, some being very minute, while others of enormous dimensions have been observed. One prism has been discovered, weighing three hundred pounds. This property is being worked by the American Corundum Company of St. Louis, under the management of Col. Jenks. The future development of the veins will be regarded with great interest, not only on account of the commercial importance of the mineral, but also because of the interesting features of the deposits; and it is not improbable that valuable gems—the ruby and sapphire—may be discovered among the commoner varieties of corundum.

—A GRATIFYING progress has characterized the production of iron in the State of Ohio. In the report of the secretary of State, returns from sixty-nine counties show results for 1870 as follows: Pig-iron manufactured, 310,033 tons. Of this 112,328 tons were produced in charcoal furnaces, and 107,705 tons were smelted with anthracite. From this pig-metal were produced various grades of manufactured iron as follows:—

Bar and nail iron	27,681 tons.
Nails	6,739 “
Hoop iron.....	8,040 “
Sheet iron.....	5,262 “
Stoves.....	7,198 “
Car wheels	2,772 “
Other castings.....	16,350 “
Spikes and railroad chairs	4,175 “
Railroad iron.....	71,405 “

The steady increase in the production of pig-iron since 1840 is exhibited by the following table:—

Year.	Tons.	Year.	Tons.
1840	25,950	1866	81,790
1850	63,658	1867	167,591
1860	105,500	1868	207,747
1863	62,156	1869	211,074
1864	50,704	1870	310,033
1865	63,991		

—ONE of the richest mines in the country is said to be the principal mine of the Eureka consolidated company, in Nevada. The Eureka district has lately been proved to be one of the most productive districts in the State, being surpassed only by the Washoe and Pioche districts. Careful estimates place the amount of ore in sight in this mine, above the 215 foot level, to be \$20,000,000. A narrow-gauge railroad is projected, to be built from the mine to the smelting works, and additional hoisting machinery constructed. New furnaces are likewise to be erected, which, together with those already in operation, will have a capacity of 300 tons of ore per day. Bad roads having retarded transportation, 500 tons of bullion, worth \$380 per ton, or a total of \$190,000 are now accumulated.

—THAT the iron industry of Philadelphia has assumed a magnitude unsuspected by even some of the residents of the city is apparent from the figures published in a recent account of the manufactures carried on within the municipal limits. From these statistics we glean the following yearly data showing the extent of the iron and steel manufactures:

Number of iron and steel establishments.....	549
Total capital invested.....	\$32,450,642
Hands employed.....	17,713
Value of products.....	\$40,653,387

Regarding the foundries and rolling mills the following figures are given:—

1. Foundries.

Number of cupola furnaces.....	88
Tons of pig-iron used.....	70,622
“ scrap-iron used.....	3,450
“ castings made.....	70,250

2. Rolling Mills.

Trains of rolls.....	35
Puddling and heating furnaces.....	101
Tons of ore used.....	6,900
“ blooms used.....	3,850
“ pig-iron used.....	32,400
“ old rail and scrap.....	12,060
Number of steam engines (48-horse power).....	3,245
Tons of bar and rod iron made.....	32,056
“ sheet-iron rolled.....	7,108
“ plate-iron rolled.....	5,000
Locomotives manufactured.....	269

—A DIFFERENCE of opinion exists among some metallurgists regarding the relative value of hammered and bloomed ingots for steel rails. In order to test the question, Mr. Wm. Lewis, superintendent of the Spuyten Duyvil rolling mill, made a number of experiments, which he has but recently communicated. The ingots used were seventy-five square inches in sectional area, and the rails—of which ten of each kind were tested—weighed fifty-six pounds to the yard. With a pile-driver hammer weighing 1,320 pounds, falling eighteen feet six inches on supports two feet eight inches apart, the following average results were obtained:—

Hammered Rail Deflection.

First blow.....	2½ inches.
Second blow.....	4½ “
Third blow (and total)...	6½ “

Bloomed Rail Deflection.

First blow.....	2½ inches.
Second blow.....	4½ “
Third blow (and total)...	6 “

From these tests Mr. Lewis draws the conclusion that a bloomed steel rail is equally as good as a more costly hammered one, and says: “With regard to first cost and economy in repairs and working, the blooming has a decided preference; and as to yield, a good mill in a given time will turn out as many blooms as the *three* best steam hammers ever made. Practically, the make of a blooming is only limited by the number of furnaces put to work.”

—THE mineral product of Germany during 1870 shows the importance which the yield of the mines has attained. The amount of coal raised was 23,000,000 tons, requiring the labor of 107,682 workmen, and valued at the pit's mouth at about \$34,500,000. Of this quantity 5,850,000 tons were mined in Upper Silesia, 1,570,000 tons in Lower Silesia, 11,760,000 tons in Westphalia, 890,000 tons in the Aachen district, and 2,780,000 tons in the Saar district. The production of lignite and brown coal was 6,116,000 tons, valued at \$4,330,000, principally from Prussia and Saxony. Among other minerals there were produced of iron ore and iron stone, 2,660,000 tons; zinc ore, 368,000 tons; lead ore, 98,850 tons; manganese ore, 11,200 tons; iron pyrites, 73,800 tons; phosphorite, 25,000 tons; rock salt, 2,000,000 tons. The total number of mines of all kinds in operation was 2,432, employing 181,770 miners and other workmen.

—AN approximate estimate of the total production of pig-iron in the world, in 1871, is given as follows by the Engineering and Mining Journal:—

	<i>Tons.</i>
Great Britain.....	6,500,000
United States.....	1,912,000
France	1,360,000
German Zollverein.....	1,250,000
Belgium	896,000
Austria.....	450,000
Norway and Sweden	280,000
Russia.....	380,000
Italy.....	75,000
Spain.....	72,000
Other countries.....	200,000
Total.....	13,815,000

The foregoing estimates are made in tons of 2,000 pounds. It will be observed that Great Britain made about one-half of the world's production of pig-iron during 1871.

—COLORADO, besides its undoubted wealth in gold and silver, abounds in extensive and valuable deposits of other metallic ores which, for the present, in the absence of thoroughly equipped metallurgical works, are practically useless. Of lead and copper alone the territory is capable of producing immense quantities, as ores of both these metals are plentiful. Nearly all the lead ores are highly argentiferous—in most cases containing silver enough to pay the entire cost of mining and reduction, leaving the lead product a clear profit. A recent writer on this subject, referring to the lead ore, remarks: "There is no longer a doubt but that it can be mined with great profit, solely on its own value, and it seems strange that capital has not become interested in its metallurgy before this time. Almost without exception the silver lodes of Colorado carry lead in larger or smaller quantities. In some cases the greater percentage of the gangue is tin or copper ores, blende and chalcopryite, or the sulphates resulting from the decomposition of these minerals; but galena veins are in a great majority, and many of them are of wonderful richness."

—THE bullion product of the State of Nevada for 1871 is stated to be \$22,177,045; and of the districts contributing to this sum total, Washoe ranks first, Pioche second, and Eureka third. The San Francisco Bulletin thinks that in a few years the product of Nevada will rise to \$40,000,000 annually. Regarding the yield of the Comstock lode, the total product of the fifteen mines embraced within its boundaries to August last is given as \$64,355,002. The assessments in the same time were \$7,691,058, and the dividends amounted to \$19,991,058, being 12,300,000 net dividends, or fourteen per cent. of the production.

—COAL cutting machines seem to be growing in favor in England. Within a short time one of these machines, the invention of Ferths & Co., has been introduced into the Woolley collieries, near Wakefield. It is propelled by compressed air, and is said to work well and give satisfaction. It is yet only employed during the night, but it is expected that it will be brought into operation in a short time on the day shifts. Coal cutting machines are also used at the Tankersley colliery and one or two other pits in the south Yorkshire district.

—IN Newton county, Missouri, extensive discoveries of lead ores have been made, and it is said that pieces of "pure lead," weighing from one hundred to eight hundred pounds, are being taken out from the deposits. This, however, is undoubtedly a mistake, as native lead is found only in extremely rare instances, when it has been found in minute grains. In miners' parlance pure galena is often called "metal," and thus erroneous reports of the occurrence of sheets and masses of lead find their way into the newspapers.

INSURANCE.

THERE is something of a parallelism in the life insurance movements of 1861 and 1871, which is worth keeping in view under the present circumstances of the life business—something of history repeating itself under a diversity of circumstances. Though the life interest occupied strongly contrasted positions in the years named, there is still accord in the respective movements. In each year, insurance being difficult to negotiate, there was a struggle to keep the line of risks obtained from falling back through the deductions from lapses, surrenders, &c. Each year closed with the amount at risk about the same at the end as at the beginning, though the comparison is somewhat in favor of the later year. In 1861 the country was in the throes of a civil war, with no definite issue discernible through its dawning alarms: this checked the fruitage of germs that had been carefully nurtured, and dissipated the results of much labor. The least hopeful thought that the interest had sustained irreparable if not fatal injury, and certainly the new-born vigor of 1860 was lost in comparative inertia or vain struggles against the tide. Ten years later, however, the business had been expanded to an extent which is now pronounced in some quarters as largely an inflation. This growth, in its annual proportions, culminated in 1868.

It is noteworthy that some European nations exhibit a life record the counterpart in miniature of the American advance in the period 1860-70, and France especially shows gains in like years, the tide of new policies abating in 1867, or about twelve months earlier than in the United States; but while in France the amount of insurance in force the last year of the decade was double that of the first year, in the United States the amount was increased twelve times. Such are the net results in both countries after providing for the various withdrawals.

So far, in the United States, the ground gained has been maintained, though the ratio of progress has declined; yet with reaction from former advance quite evident, the business shows a force of resistance to all depreciation that indicates that its inherent strength has not been impaired by any present checks upon its further development.

The civil war temporarily impeded life insurance, but the winding-up of the Great Western was a far heavier blow to the interest than the firing on Fort Sumter. The first came when the life business was in the vigor of a new impetus; the second when it was exhausted by the very extent of its work. To the rescue against the first depression came the financial stimulus which attended the progress of the war; the second disaster, instead of being mitigated, was aggravated in its far-reaching evils by the existing monetary situation.

The year 1871 began with the shadow cast over the horizon by the suppression of the mismanaged Great Western—the weakest offices necessarily became weaker—their obliteration a mere question of time—the stronger offices suspected—the whole scene pervaded with portents of disaster; yet the general organization was equal to the struggle which had been brought upon it, and instead of being borne down, the companies, as a whole, closed the year with a net increase in sum insured of from \$30,000,000 to \$40,000,000—a result, considered by itself, possibly not worth the cost of its obtainment, yet a grand

consummation in view of the fact that the work of the year was as much for preservation as for production.

The two years we have cited had, however, very different indications: in the first year it was a fair inference that the country was about equal to the prosperous support of half a score of life companies; now there are single companies, each of which is more than that half score aggregated as one. Companies doing business in New York in each year constituted the greater portion of our life insurance organization, and the New York figures, therefore, serve to illustrate the general interest in its past and present. In 1861 there were seventeen life companies doing business in New York; the list of 1871 embraces sixty-five companies. In 1861 the average income of the seventeen companies was \$370,200; in 1871 the average income of sixty-five companies was \$1,707,062. Out of the seventeen companies of 1861, seven had a yearly income less than \$100,000. Of the sixty-five companies of 1871, only four show less than \$100,000 of year's receipts. Of the total insurance, four of the companies of 1861 carried 64 per cent., and seventeen of the companies of 1871 carried 51 per cent.—the four companies of the earlier year carrying in 1871 more than four times the total insurance of 1861.

The whole result, as it sums up, is the creation of all the companies in vastly different proportions: that the total would have been a fraction less by the non-existence of the least efficient organization is possibly within the reach of proof. Evidently, however, the weaker companies have done more for the stronger ones than they did for themselves. When a company is not in a position to be actually competitive, it simply becomes tributary to what it would rival—it discloses and commends the strength which it opposes by its own weakness in the comparison, and the evaporating life-blood of the dying dwarfs is absorbed into the flesh of the living giants.

That the whole American life insurance organization has not been weakened by the multiplication of companies is provable by irrefutable facts and figures. New companies entering the field have been powerless for any redistribution of the business; they have had to work upon their own ground, and whether sowing without themselves reaping, or reaping by the law which declares for the "survival of the fittest," there has been no available interference with that tendency to concentration—"much comes where much is"—which solidifies the economy as it piles up its increasing totals.

The development of the principle of the life system in a degree has kept pace with increase of wealth and insurances. Such development will doubtless be contributive to the future growth. While the starting-point to the practice on the part of its participants is simply Precaution, life insurance in its workings is essentially a Capitalist; and from the vantage-ground now gained new movements start, based upon a fuller recognition of the latter fact. In this feature the endowment policy had its origin, and the momentum which this form of the life contract gave to the business will be repeated by the measures which proceed from advances in the same direction.

—AFTER a year's suspension of the National Board of Fire Underwriters the organization has been resumed. The sixth annual meeting was convened in New York, April 17th. At the suggestion of Mr. Heald a committee of seven was appointed to employ competent persons to organize local boards, each of such boards to determine rates in its own locality. Mr. Oakley, the president, delivered an address, which was a review of the fire insurance field. We cite the conclusions reached from the tabulated movements of the business:—

"The table of 1871 is quite incomplete as regards the whole business of the year, but gives us the result of the business of those companies which survived the Chicago disaster, including their Chicago experience. Table No. 1 (dividends) shows that the dividends of the year averaged for New York State companies, 10.22; companies of other States, 11.85; average of both, 11.02. It should, however, be borne in mind that the dividends of the year had all been made prior to the Chicago fire, and I therefore include those made

by companies which suspended with the following results, reducing the average of companies of New York State to 9.84 against 11.26 in 1870, a falling off of 1.72, or \$514,331.00; and of companies of other States to 10.80 against 13.35 in 1871, a falling off of 2.55, or \$684,875—making the grand average for the year to be 10.29 against 12.34 in 1870, or a difference of 2.05 or \$1,199,007.09 in the amount realized by stockholders from their investments in insurance capital as compared with 1870, while the average for the thirteen years for New York State companies appears to be 9.73 against 9.90 for twelve years; and for companies of other States 12.50 against 12.80, and for both an average of 10.75 against 10.98 for the same period.

"Table No. 2 (premiums and losses), without taking into account the suspended companies, shows an advance in the percentage of losses *paid* to premiums for New York State companies from 55.41 in 1870 to 76.50 in 1871; companies of other States from 62.58 in 1870 to 92.58 in 1871, and in the aggregate from 58.72 in 1870 to 85.18 in 1871, and giving a grand aggregate of 61.15 for thirteen years against 58.07 for the twelve years.

"Table No. 3 (expenses) shows an apparent decrease in percentage from 85.51 in 1870 to 26.65 in 1871; but adding the premiums received on inland business, \$2,918,150.70, to the fire premiums, it makes a grand total of premiums in 1871 of \$39,902,720.70—and adding, also, the losses on inland business, which were \$1,907,489.22, makes the total losses in 1871 to be \$33,411,669.22, or 83.73 of the premiums. If to this we add the percentage of expenses, as above, we have a total of expenditure of 110.38, or a loss of \$4,141,902.40, by the companies on the business of 1871.

"Table No. 4 (percentage of ability) shows that the ability of the companies to write, which in 1870 was \$206.20 for every dollar of loss, was reduced in 1871 to \$133.56, or \$88.67 less than it was in 1869.

"The result of thirteen years' business, therefore, shows a profit amounting to \$22,791,066 arising from the business, leaving out, of course, the suspended companies. The dividends paid by the companies during the same time were \$58,138,865. The companies paid to the stockholders \$35,347,799 realized from their investments during that period, and as the average capital during the period referred to was \$41,596,153, which at 6 per cent. interest yielded them \$32,450,000, it can readily be seen that the additions to the surplus of the companies have not been large. The amount of the capital of companies doing business prior to October, absorbed by the fire, was \$23,800,702. I have been unable, for want of time, to add to this the amount of insurance capital lost during the last twelve years, which would enable us to realize, perhaps more fully than we now do, how little we have to pride ourselves upon in our business."

—UNITED STATES district court; in bankruptcy. *In re*, The Hercules Mutual Life Assurance Company, New York city. In this case Rosalie Libline filed a petition to throw the Hercules Mutual Life Assurance Company into involuntary bankruptcy. The petitioner alleged that the indebtedness arose on a promissory note for \$1,000, made by the company in its corporate name, and signed by the president and assistant secretary. The act of bankruptcy was asserted to be that the company stopped and suspended, and did not resume payment of its commercial paper within a period of fourteen days from November 19, 1871, to January 6, 1872; that a large amount of this commercial paper has been issued while it was insolvent, and that this paper is past due and remains unpaid. It is further claimed that the company could not be able to pay in the ordinary course of its business, being insolvent at the time of issuing this paper, and that it has property which it has fraudulently refused and neglected to appropriate towards the payment of this indebtedness. After considering at length the question whether, under the 34th section of the bankruptcy act, the company is a banker, broker, trader, miner, merchant, or manufacturer—under the meaning of the act—Judge Blatchford held that it did not come within these six classes, that the company did not fraudulently suspend payment of its commercial paper, and he dismissed the petition with costs.

HISTORY OF GERMAN FIRE INSURANCE.

—GERMAN historians represent public insurance as the fruit of Germano-Christian civilization, and of the ancient communal and corporation system of the Germanic tribes. The duty requiring mutual assistance for the brother or clansman, when injured by fire or other accidents, is an old feature of Germanic corporations and guilds, and much older than private insurance. The invention of the latter, as regards marine insurance, is ascribed to the Italians and the Dutch, who were the greatest trading nations during the middle ages. The first "chamber of insurance" is said to have been established in Brugge, (Flanders.) In the field of fire insurance private enterprise appeared in England in 1696, in the Hand in Hand Association. In Wurtemberg, in 1726, a private society, on receipt of six per cent. of the insured value, undertook to pay the loss by fire. Mercantile enterprise, besides the insurance by individuals, formed insurance stock associations in England in 1710, by the establishment of the Sun fire office; in Germany in 1763 and 1765 by the formation of insurance companies for risks at sea and by fire; in Hamburg and in Prussia under decree of January 31, 1765.

Thus, while the idea of private insurance arises at a period in which the mercantile element had taken root, the principle of associative general insurance is met in the ancient guilds, which, (Wildæ, *History of the Guilds in the Middle Ages*, 1831,) "by a combination of christian ideas with ancient German customs, founded a brotherly union of members who engaged an always ready help to their brothers to promote their temporal and eternal welfare." In cases of great losses by fire or shipwreck the member received a definite sum for his relief. Under Charlemagne (779) it was well known that among the longobards guilds existed affording such relief.

Similar to this, the north of Germany, the inhabitants of which maintained a well-developed poor-law, held it a public duty to assist the man who lost his house by fire. A like arrangement existed in Denmark, and the most exact description of the oldest mode in which this duty was discharged is contained in Dahlman's *History of Denmark*, relating to Iceland, about the year 1262. According to this, the lowest municipal corporations (Repps) joined into insurance societies against the death of cattle and the loss by fire. Their agreement insured three rooms of each man's house—a chamber, a fire-room, and a provision-room; also, the prayer-house or church belonging to the house. Clothing and daily provisions were likewise included, but no merchandize or ornaments. The owner was indemnified to one-half the value of the house, and one regulation prescribed that the Repp-union should not be bound to give one man aid three times.

With the disappearance of the ancient guilds and corporations, which had embraced and protected the entire individual with his goods and chattels, the desire and spirit of fraternal aid expressed itself in the creation of new fire-guilds, which in most cases leaned for support on the former corporations. The establishment of the oldest institution of this kind in Germany dates back to the first part of the fifteenth century, and took place in Schleswig-Holstein under Duke Adolphus VIII. There existed in Schleswig in the year 1446 two fire-guilds of Southstapel and Northstapel; in 1521 were added one in Bergenhusum and Wohlde; in 1600 that of Ervede, and in 1603 that of Drage; in Holstein, since 1541, the Kremper Fire and Schützensgild, and in 1548 the Guild of our Lady at Itzehoe; finally, in 1691, both countries established in common the Schleswig-Holstein Brand und Schützensgilde.

The archives of Hamburg give information of the adoption, December 8, 1591, of a so-called "fire contract," and in 1676 a union in this city was formed by forty-six fire-saving funds into one general fire fund with well-matured regulations of administration. Up to 1679 five other funds (Kassen) were established, all of which are existing at the present day.

In Prussia a colony of immigrants, settled on the lower banks of the Vistula, founded as early as 1628 the Gross Werder Fire Fund, in which they insured houses, crops, cattle, &c. This was followed in 1637 by the Nehrung Fire Order, and in 1812 the fire orders at the lower Vistula numbered twenty-two. A constitution of the Great Werder Fire Order dated May 29, 1628, is still extant.

During the seventeenth century institutions under the name of "provincial funds" were introduced in Denmark, the first in Copenhagen 1683; that in Magdeburg 168; in Harburg in 1738: but only at the commencement of the eighteenth century the governments undertook the regulation of matters of fire insurance. A proposition to make the payment of a premium for insurance, based on the results of thirty years, obligatory on every house-owner is said to have been made by Count Anton, of Oldenburg. However, the first direct interference of the highest power in the State took place in the electorate of Brandenburg in 1701. It ordered the association of each six to ten villages into a fire society to provide in cases of large losses by fire. Subsequently the general fire fund regulations of June 1, 1706, compelled the establishment for all cities and rural districts of a fire society for the insurance of buildings, leaving it to everybody's option to insure furniture also. The contribution was fixed at three groschen per one hundred thalers (one per mille). This plan failed, and the government, after repealing the act, fell back upon the system of city and county societies. The first regulations issued for a city fire insurance company were those for Berlin, September 29, 1718, and a number of others organized in various cities, some for the protection of buildings only, while others insured stock of grains, &c.: large numbers were established in the rural districts, which by and by combined into larger associations. The city government of Hamburg united its forty-six fire funds into one general fund as early as 1676. During the second part of the eighteenth century fire insurance societies extended over the whole of northern Germany. In Hanover the first was founded in 1750; in Brunswick in 1750; in Oldenburg in 1764; in Lubeck in 1765, &c. In south Germany the earliest attempts were made by a mutual private association in Wurtemberg in 1726; here the erection of a public institution of this class took place in 1754, which charged two and a half per mille premium. The Fire Insurance Fund of Baden-Durlach dates from 1758, that of Baden-Baden from 1766, and the Hesse-Darmstadt Society from 1777. In 1811 the government of Bavaria chartered a fire insurance society, by which, without compelling insurance therein, it abolished all other like establishments.

Thus the protection against loss by fire or from other accidents, which during the middle ages was secured by municipal and corporate right, was replaced by free corporate or communal societies formed by the voluntary union of the house-owners in a town or municipality, generally with the coöperation of the local authorities, first in the cities and finally in the rural districts. The combination of single large estates was imitated by single townships, and a final general concentration took place at the order of the sovereign. Of all experiments made during this long period in establishing private mutual societies, only a few have continued to this day: the Schleswig-Holstein Fire-guild, which in 1760 cut loose from the Fire-guild of Schleswig; the Mutual Fire Association of Hamburg, founded September 24, 1795; that of Bremen in 1800, and the Mecklenburg Mobiliar Fire Insurance Company in New Brandenburg, which insures houses, merchandize, and factory implements. Still the result of these experiments should not be undervalued. There were in Germany and in Denmark at the beginning of the present century well-ordered public associations extending over all the immovable property, including the

poorest districts and the meanest huts, and in some parts also over the movable property, a protection against the dangers from fire.

The first part of the present century, from 1808 until about 1832, brought great changes into all the social relations of Prussia. The transition from the old feudal conditions, the improvements in agriculture and industry, the development of trade and commerce, exerted their influence on matters of insurance and called forth a desire for a revision of public corporations, and also of the system of insurance. Decisive in this respect was the changing relation of private industry to insurance, which engaged attention about the year 1830. The progress of agriculture and industry caused an increase of personal and movable property, and with the alteration in the old order of things, increased also the want of security among men much more isolated than before. These two movements are the cause of private organizations undertaking insurance, since public institutions did not satisfy that want of it. In 1812 was founded the Berlin Fire Insurance Company; in 1823 the Elberfeld Fatherland; in 1825 the Aix-la-Chapelle and Munich Insurance Society—all stock associations; in 1819 the Mutual Fire Insurance Company of Gotha; in 1826 the Mutual Fire Insurance Company of Schwedt.

The fact of insurance of movable property not having been undertaken previously in Prussia, and the absence of any control of the transactions of these companies, led to many abuses, and required a revision of the legislation on this subject. A law of May 8, 1837, regulated the duties of societies and agents, and introduced a current control of all their transactions. The general revision of the laws on associations led to greater centralization by diminishing the number of fire insurance institutions in a certain territorial limit. The distress of the years 1847-48 also exerted great influence on the existing system of fire insurance. In Prussia the amounts insured, of 1,176,000,000 thalers in 1849, fell to 76,000,000 in 1856. Carelessness in administration induced severe losses; and the rates for insurance, from about 2.04 per mille in 1845 and 3.85 in 1849, rose about 89 per cent. The Fire Society of Silesia increased its premiums from 2.65 per mille in 1844 to 9.45 per mille in 1852. A new reorganization of the societies in Prussia became necessary; and numerous decrees of the government, tending to introduce a better classification and estimate of the value of property insured, showed a marked result in the rise of the amount insured to 1,729,000,000 thalers in 1866. The number of foreign societies taking insurance in Prussia had also considerably increased, and the law of May 8, 1837, withdrew the consent of the government from foreign companies—so that of twenty-seven before operating in the State, only nine obtained a new permission. This soon gave occasion to the establishment of new private associations, among which, 1839, the Fire Insurance Society, Colonia, in Cologne; 1843, the Fire Insurance Society, Borussia, in Berlin (dissolved 1855), the Fire Insurance Bank in Leipzig, New Fire Insurance Company in Hamburg; 1844, the Magdeburg Fire Insurance Company; 1845, Stettin National Fire Insurance Society, the Rhenish Prussia Fire Insurance Company in Düsseldorf (dissolved 1848); 1848, the Silesian Fire Insurance Society in Breslau; 1853, Insurance Society Thuringia, at Erfurt; 1855, the German Phoenix in Frankfort-on-the-Main; 1859, Fire Insurance Branch of the Bavarian Mortgage and Exchange Bank in Munich; 1860, German F. I. Stock Association, Berlin, the Society of Oldenburg, the Providentia in Frankfort-on-the-Main; 1861, Dresden Fire Insurance Association. Upon this historical basis Germany has now different fire insurance institutions, namely:—

A.—MUTUAL INSURANCE.

1. PUBLIC SOCIETIES.

Public Insurance Societies in Germany at the beginning of the year 1868, and their operations during the year 1867.

Location.	No. Societies.	Amt. insured. Thalers.	RECEIPTS.			EXPENDITURES.			Reserve fund. Thalers.
			Contributions. Thalers.	Pro mille of amt. insured.	Total receipts of every kind	For losses by fire. Thalers.	Pro mille of amt. insured.	Total expenditures of all kinds	
Prussia (old prov.).	28	1,937,473,425	4,275,897	2.207	4,524,075	3,575,467	1.847	4,162,923	4,324,323
" (new ").	14	711,121,312	1,112,527	1.564	1,156,745	1,102,892	1.543	1,197,353	981,375
Saxony, kingdom..	1	536,015,700	1,300,773	2.257	1,329,843	1,329,616	2.481	1,444,025	* 245,346
Bavaria.....	2	712,657,440	1,884,651	2.634	1,934,822	1,739,110	2.44	1,823,719	1,043,291
Wurtemberg.....	1	362,765,068	287,321	0.792	318,022	279,253	0.770	319,462	490,575
Baden.....	1	219,514,027	315,139	1.436	317,373	269,313	1.227	306,497	.....
Hesse Darmstadt..	1	191,783,989	216,112	1.127	217,902	201,176	1.049	217,538	124,354
Mecklenb'g Schw..	3	43,958,272	134,509	3.08	138,571	136,198	3.07	141,027	79,778
Oldenburg.....	1	40,253,365	50,488	1.478	60,927	33,944	0.844	35,650	.....
Weimer Eisenach..	1	60,416,615	81,538	1.350	96,672	81,032	1.341	96,151	212,081
Altenburg.....	1	35,045,875	.....	.....	3,967	21,333	0.609	21,717	39,732
Gotha.....	1	19,272,430	62,937	3.268	63,998	13,284	0.689	20,254	.....
Brunswick.....	1	72,390,025	77,136	1.066	91,919	121,363	1.676	130,267	450,000
Dessau Kolhen....	1	30,176,290	45,720	1.515	46,077	50,426	1.671	52,529	6,671
Bernburg.....	1	10,823,737	12,393	1.145	19,029	6,698	0.612	18,497	2,113
Lippe Detmold....	1	17,636,300	23,515	1.333	23,540	15,698	0.890	19,937	23,000
Lippe Schaumburg	1	5,221,690	5,802	1.111	5,902	4,140	0.736	4,730	7,103
Waldeck.....	1	14,680,806	17,395	1.489	17,870	28,469	2.456	29,629	10,286
Bremen.....	1	2,691,340	4,038	1.508	4,548	5,195	1.936	5,982	12,134
Lubec.....	1	15,579,022	5,343	0.343	13,769	61	0.004	11,584	166,993
Hamburg.....	2	135,972,070	123,458	0.901	138,392	90,672	0.667	171,299	166,126
All others in Germ.	..	2,523,855,165	4,566,278	1.809	4,753,053	4,427,144	1.754	4,873,335	2,549,133
Total 1867.....	..	5,172,449,902	9,954,702	1.925	10,433,873	9,106,498	1.760	10,234,311	7,704,842

* Loss.

To this are added the total results for 1868 and 1869:—

Location.	Amount insured. Thalers.	RECEIPTS.			EXPENDITURES.			Reserve fund. Thalers.
		Contributions. Thalers.	Pro mille of amt. insured.	Tot'l rec't ev'y kind. Thalers.	Losses by fire. Thalers.	Pro mille of amt. insured.	Total of all kinds. Thalers.	
Prussia.....	2,721,664,218	6,425,261	2.36	6,785,840	6,597,166	2.42	7,807,196	4,364,124
Germany (excl. of Prussia)...	2,614,643,845	4,871,457	1.86	5,035,459	5,223,902	2.00	5,644,430	1,945,071
Total 1868.....	5,336,308,063	11,293,718	2.12	11,821,299	11,821,068	2.22	12,951,626	6,309,195
Prussia.....	2,802,158,600	6,091,563	2.19	6,415,141	5,456,798	1.95	6,199,742	4,770,229
Germany (excl. of Prussia)...	2,700,995,166	4,704,165	1.74	4,929,391	4,071,532	1.51	4,591,151	2,307,573
Total 1869.....	5,503,153,866	10,795,728	1.96	11,344,542	9,528,350	1.73	10,790,896	7,077,799

The total amount insured in real estate in 1867 is given above at ... 5,172,449,902 thalers.
Add to this on movables..... 90,544,958 "

Total for public insurance societies..... 5,262,994,860 thalers.

Of a few associations the statistical data were not received. The total amounts insured in 1868 were 5,435,797,864 thalers, and in 1869, 5,598,434,075 thalers: of which, real estate in 1868, 5,322,931,611 thalers; in 1869, 5,469,849,750 thalers: personal property in 1868, 112,866,253 thalers; in 1869, 128,584,325 thalers.

Location.	Assessments pro mille.					Paym'ts for losses pro mille.				
	1856-65 average	1866	1867	1868	1869	1856-65 average	1866	1867	1868	1869
In the old provinces of Prussia....	2.819	2.322	2.907			2.083	2.083	1.847		
“ new “ “ “	1.888	2.014	1.564	2.30	2.12	1.807	1.538	1.543	2.42	1.95
Rest of Germany.....	1.580	1.517	1.808	1.86	1.74	1.867	1.539	1.751	2.00	1.51
Aggregate.....	1.900	1.888	1.925	2.12	1.95	1.675	1.750	1.780	2.22	1.73

The total receipts exceeded the total payments in 1866 and 1867, viz.:—

	1866.	1867.	1868.	1869.
In old prov. of Prussia, by... 149,880 thlrs.		361,152 thlrs.	} defct. 521,356	exc. 564,765
In new prov. of Prussia, by... 260,563 “		40,008 “		
Rest of Germany..... 229,461 “		120,882 “		
Net total	180,982 “	199,612 “	defct. 1,180,327	exc. 1,197,378

A special statement of thirteen insurance societies in Prussia, which rendered uniform accounts, will not fail to be of interest. They insure four classes of buildings, viz.:—

- 1st class—Massive buildings, with roofs of hard materials.
 2d “ —Partly massive buildings, with roofs of hard materials.
 3d “ —Buildings with roofs of light materials.
 4th “ —Buildings for industries exposed to danger of fire.

	Amounts insured. Average 1866-67.	Assessments. Average 1866-67.	Payments for losses. Average 1866-67.
1st class.....	422,397,185 thalers.	856,255 thalers.	515,768 thalers.
2d “	864,036,690 “	1,632,851 “	1,214,265 “
3d “	263,197,600 “	3,190,748 “	3,219,100 “
4th “	19,919,575 “	155,022 “	174,475 “

Expressed in pro mille rate of amount insured, average for 1866-67:—

	Assessments.	Payments.
1st class.....	1.01	0.61
2d “	2.24	1.53
3d “	6.06	6.12
4th “	3.89	4.88

The total results for Prussia, Anhalt, and Bavaria, are thus given for 1868 and 1869:

	Amounts insured. In thousands of thalers.		Assessments. In thalers.		Payments for losses. In thalers.	
	1868.	1869.	1868.	1869.	1868.	1869.
1st class....	801,631	687,515	1,157,488	978,452	797,305	579,638
2d. “	741,146	761,285	1,850,273	1,528,213	1,761,307	1,429,503
3d “	500,814	501,675	2,655,399	2,818,592	3,272,438	2,607,704
4th “	42,898	44,389	144,214	142,413	181,354	259,846
	2,086,489	2,144,864	5,807,374	4,960,670	5,962,399	4,876,686
Average, 1868 to 1869.						
{ 1st class....	762,380		1,003,261		612,043	
{ 2d “	703,088		1,554,019		1,339,013	
{ 3d “	497,202		2,426,208		2,792,046	
{ 4th “	42,446		186,814		168,597	
			Pro mille amt. ins'd.		Pro mille amt. ins'd.	
			1.32		0.80	
			2.21		1.90	
			4.87		5.62	
			3.22		8.97	

As to the danger of fire in the following statement of nineteen societies, the difference between rural and city insurances will be seen at a glance. During the years 1866 and 1867 one fire broke out in Berlin per 1844, in Hamburg per 1021, in Breslau per 3016, in Frankfort-on-the-Main per 1535, in Lubeck per 5285 inhabitants. In the same time, as regards cities, of 280 fires 15 were positively and 12 probably caused by carelessness, 1 by defective heaters; while in the rural districts, of 1,201 fires 28 were caused by positive and 59 by supposed carelessness, 30 proved and 16 supposed defective heaters. Thus the two causes mentioned reached in cities 33.91, in rural districts only 11.07 per cent.

Fire Insurance Associations in	Average number of insured.		Average amounts insured.			Number of fires.		
	Houses & outbuildings surrounded by court-yard, &c.	Other buildings.	Total. Thalers.	Per court-yard.	Per building.	Total, 1866-7.	Per 1,000 court-yards.	Per 1,000 buildings.
Berlin, Breslau, Frankfort-on-the-Main, Lubeck, and Hamburg, (5) {	28,974	4,742	467,254,790 15,149,630	16.127	3.195	708 7	12.23	0.74
United rural in Hanover, Bremen-Verden, Kurhessen, & oth. rur'l twns. (4) {	34,303	55,042	75,362,660 56,373,190	2.197	1.024	162 110	2.36	1.00
In rural districts (6) {	386,703	606,675	383,390,446 275,632,122	991	342	1,723 1,366	2.23	0.55
Westphalia, Nassau, Bavaria, Wurtemb'g, Baden, Old'n'b'g, cities & rur. dis. (6) {	538,188	2,833,504	576,262,543 1,576,236,220	1.075	556	2,731 5,234	2.55	0.56
Total {	986,170	3,699,963	1,502,270,441 1,922,591,162	1.523	520	5,324 6,717	2.70	0.58

Regarding the number, extent, and causes of fires, the following data are the results of twenty-nine insurance institutions representing amount insured of 3,907,831,000 thalers (about four-fifths of real estate insurance in Germany) during twelve years, from 1856 to 1867, which, during that time, paid for 63,480 cases of fire the sum of fifty-six and a half million thalers. The number of fires averaged per year—1856-60, 4,508 (in 1856, 4,655, in 1857, 4,655); 1861-65, 5,535 (in 1863, 5,877, in 1865, 6,014); 1866, 6,189; 1867, 7,326.

Increase, per cent., in amount insured:—

	Cities.	Country.	City and Country.	Total.
Annual average, 1861-5....	24.16	19.80	23.49	23.16
“ “ 1866	45.64	36.52	45.16	44.24
“ “ 1867	49.66	41.64	50.30	49.33
Increase, per cent., in number of fires:—				
1861-5....	30.09	12.01	24.69	23.79
“ 1866	48.38	29.49	38.22	37.29
“ 1867	68.34	46.18	66.02	62.15

The transactions of these twenty-nine companies are divided thus: Large cities (ten insurance companies), rural districts (eight insurance companies), and cities and country (fourteen insurance companies), as follows:—

The extent of insurance of real estate by public associations in many of the States of Germany is seen from the following statement:—

STATES.	Area in sq. geographical miles = 21.19 Eng. statute miles.	Inhabitants. (Census of 1867.)	Insurance of real estate, Dec. 31, 1869.		
			Total amt. (halers.)	Pr sq. ge. mile	Pr inh
Prussia.....	6,388	24,040,148	2,690,183,670	421,131	118
Saxony.....	272	2,423,586	561,573,080	2,064,614	232
Bavaria.....	1,882	4,824,421	772,679,592	559,102	160
Wurtemberg.....	854	1,778,479	393,080,704	1,116,047	222
Baden.....	278	1,484,970	234,608,515	843,897	164
Hesse, Grand Duchy.....	140	823,188	196,502,657	1,408,950	239
Mecklenburg.....	204	659,388	102,606,206	849,001	156
Oldenburg.....	98	245,608	47,990,998	487,663	195
Saxe-Weimar.....	66	283,044	62,955,425	938,870	222
Brunswick.....	67	302,793	75,899,673	1,132,831	251
Anhalt.....	48	197,041	49,599,420	1,038,831	252
Saxe-Gotha.....	26	119,245	20,475,940	787,538	172
Saxe-Altenburg.....	24	141,428	38,893,755	1,620,574	275
Lippe Detmold.....	21	111,352	18,351,350	873,874	165
Waldeck and Pyrmont.....	26	56,809	12,058,467	602,923	112
Schaumburg Lippe.....	8	31,186	5,221,690	652,711	167
Hamburg.....	6	305,196	168,053,403	28,008,917	551
Lübeck.....	.....	48,588	16,187,618	.....	332
Bremen, rural districts.....	.....	22,730	2,530,469	.....	111
Total.....	9,495	87,849,097	5,468,612,831	576,219	145
Total in U.S. square } miles & gold values }	201,199		\$3,937,401,238	19,575	104

(To be continued.)

—**REALLY** the Phoenix Mutual Life Insurance Company of Hartford is something of a wonder. It demands and wins new and larger observation. This office, once marked by a slow-paced conservatism, now goes ahead while the general business stands still. Its gain in 1870 was remarkable; and now comes a gain in 1871 even upon the advance of 1870.

The management of this company shows itself not only fitted for its duties, but absolutely master of the situation. The work it is doing bespeaks an ability not only of a high order, but rare as it is great. What is to others difficulty and perplexity, appear to be to it opportunity. Hartford is notable for first-class insurance talent, yet the Phoenix Mutual is surpassing all the other Hartford life offices—has surpassed them in new business.

That the last three years were against the growth of life insurance—repressive of its enlargement—is now an old and weary tale; yet the Phoenix is twice the company it was four years ago. Some of the figures for the last three years will show how this company has thriven and been victor over the perverseness of the times, viz.:—

	Income.	New policies.	Policies in force.	Amount insured.	Assets.
Year ended Dec. 31, 1869.....	\$3,431,562	8,625	21,437	\$51,096,765	\$4,998,313
“ “ 1870.....	2,827,638	9,065	24,576	56,617,647	6,090,562
“ “ 1871.....	3,135,736	10,039	28,696	63,498,994	7,510,614

The monthly amounts of new insurances is a record of steady work, rising from the depression of January to the harvest of December, and so significant that we give it insertion here:—

AMOUNT INSURED MONTHLY, 1871.

January	\$ 631,304
February	1,458,840
March	1,607,667
April	1,427,448
May	1,684,058
June	1,711,830
July	1,526,782
August	1,023,237
September	1,660,409
October	1,607,265
November	1,733,360
December	3,194,142
	<hr/>
	\$19,866,362
California	281,500
	<hr/>
	\$20,147,862

The net result of last year was a net gain in amount insured equal to about one-sixth of the increase of life insurance in the United States in 1871.

In 1871 no less than \$1,817,204 was paid to policyholders for dividends and death claims, the amount for dividend being somewhat greater than that for losses. The percentage of management expenses was far below the average of the general business, showing that the results of 1871 were cheaply purchased, and that economy went hand in hand with vigor.

The strong financial position of the Phoenix is shown in the fact that of the total assets no less than 20.74 per cent. is net earned surplus.

We have spoken of the ability of the management; but perhaps even more than to the combined sagacity and energy which plans and executes, success is due to the spirit of its administration. There is not wanting that highest of qualifications which can see the wisdom of not restricting the scope of the life contract by official captiousness. In the present trial-time of life insurance the Phoenix is ready to meet the tests and satisfy the intelligent demands of the public. It exercises all the liberality of a just equity; never puts itself in a hostile attitude towards its policyholders; does not have one language for the man that is *to be* insured, and other words for the man that *is* insured; does not array the general interest of the company against the particular interest of any member; does not put itself in the position of being merely and as wretchedly honest as the law compels it to be: it is in brief simply and without qualification just, truthful, considerate, and as a consequence policyholders and people believe in it, and their faith is to the company sustaining and helping power.

—FIRE MARSHAL WILLIAMS, of Chicago, in his annual report for year ended March 31, 1872, gives the following figures of the great October fire: this statement comes at ample time has been afforded to verify details. The marshal limits the fire to a duration of 28 hours, and places the number of buildings destroyed at 25,000, covering an area 2,000 acres. His estimate of the losses is undoubtedly trustworthy, and he divides the same as follows:—

<i>Buildings.</i>	
Business blocks	\$33,515,000
Railroad depots and chamber of commerce	2,700,000
Hotels	3,100,000
Theatres	665,000
Buildings and publishing companies	933,000
Public buildings, city and county	3,334,000
Schools and churches	3,333,000
Brick and frame dwellings and light business places	8,900,000
Total	\$52,000,000

Personal Property.

Grain and flour.....	\$ 1,332,500
Produce and provisions.....	2,280,000
Lumber and coal.....	1,444,000
Dry goods.....	13,500,000
Boots, shoes, and leather.....	1,175,000
Books and paper stocks.....	1,845,000
Groceries and drugs.....	5,185,000
Clothing and millinery.....	5,260,000
Hardware.....	3,810,000
Musical instruments and jewelry.....	2,900,000
Hats, caps, and furs.....	1,060,000
Stock, machinery, and products.....	13,255,000
Stocks and business furniture.....	26,775,000
Household property.....	41,000,000
Manuscript works and public records.....	10,000,000
Libraries and moneys.....	7,710,000
Total.....	\$138,526,500

Total loss.....\$190,526,500

Total insurance on same.....90,000,000

Loss over insurance.....\$100,526,500

WE find the following in the address of President Oakley at the late annual meeting of the National Board of Fire Underwriters in New York: "Among the notable events of the past year the National insurance convention, held in this city in May and October, 1871, and composed of the officials of the various States of the Union, charged with the oversight of insurance, deserves more than a passing notice. The opportunity afforded by this convention for a full discussion of all the principles that should underlie State supervision was thoroughly embraced by the members."

This is news to us. We should much like to know upon what occasion and by whom discussed. The fact is just the reverse of this statement. The relation of the State to the insurance principle and the insurance corporation—the very first subject for the consideration of such a body as the convention—was scarcely heard of in the proceedings. There was no committee appointed on State supervision; neither was the nature and scope of departmental operations within the enquiries of any such committees as were appointed. Instead of such investigation, the discretionary power of department heads was foisted upon the convention, and the outline of a general insurance law was put forth, in which the true functions of a superintendent or commissioner were perverted in order that the meanest and vilest kind of petty despotism might be set up.

The true groundwork of all State relations to the matter of insurance is that the law, not the superintendent, shall be master of the companies; and further, that the law shall be master of the superintendent, too. Then the statute must, to be worth anything, be in subordination to the requirements of the insurance economy. Within the limitations of that economy the insurer must be free, and upon that freedom no superintendent can rightfully trespass. The whole proper scope of insurance legislation, as such, is included in two divisions, viz., a Standard and a Statement—the two in correlation—and the duties of the superintendent relate to these: his authority should be equal to the full exposition of these two great requirements—equal to the last figure and the last fact, and no more.

—THE large, responsible and prompt dealings of those British insurance companies which have established themselves in the United States, have given great present popularity to this branch of the American insurance security. As a consequence, a number of other foreign companies taking advantage of such prestige, are preparing to enter the American field. Our own position in regard to international insurance is well understood; we welcome all companies that are really an acquisition, and have always opposed all

attempts to impose restrictive legislation upon them; it is therefore in no spirit of hostility to the coming companies that we caution our readers to exercise discrimination in regard to foreign as well as American companies. There were before this some English companies in the United States that were not exactly of the standard of the Imperial, the Royal, Liverpool, London and Globe, the Commercial Union, &c. The British insurance graveyards contain as many tombstones as do the like cemeteries in the United States.

—THE State Insurance Company of Philadelphia has completed its organization. The list of stockholders embraces a fair representation of the business men of the city, who have made up a capital of \$100,000. The officers of the new company have had considerable insurance experience, and we have reason to infer that the State will be a carefully conducted office, responding promptly to its engagements.

—In our issue for April we gave a tabulation respecting fire and marine insurance companies doing business in Massachusetts, in 1871, from advance sheets of the seventeenth annual report of the commissioner. Mr. Clarke has now issued Part I (fire and marine insurance) complete. The report well sustains the high reputation of Mr. Clarke's administration, and from it we make the following abstract:—

The previous annual report enumerated 195 companies then authorized to transact a fire and marine business in the state, including 97 home companies. No former year has witnessed so many changes in the ranks of insurance competitors in this commonwealth as this. Following the results of the Chicago fire, which involved more than half of these companies, and closed the doors of thirty-nine of them, there has been an unprecedented influx of new representatives seeking business advantages from the vacancies thus created. Twenty-nine new companies have been examined and admitted to the State since the last report.

New Home Companies.

Pemberton Mutual Fire, Lawrence; Faneuil Hall (Mutual) Insurance Company, Boston.

Companies from Abroad.

Commercial Union Assurance Company, London, Eng.; Eastern Insurance Company, Bangor, Me.; Alemannia Fire, Cleveland Ohio; Brewers and Malsters' Insurance Company, New York, N. Y.; Star Fire, New York, N. Y.; Hoffman Fire, New York, N. Y.; Fairfield County Fire, South Norwalk, Conn.; Glens Falls Insurance Company, Glens Falls, N. Y.; Exchange Fire, New York, N. Y.; Pennsylvania Fire, Philadelphia, Pa.; Aetna Fire, New York, N. Y.; Williamsburg City Fire, Brooklyn, N. Y.; Humboldt Fire, New York, N. Y.; Amazon Fire, Cincinnati, Ohio; Triumph Fire, Cincinnati, Ohio; German Insurance Company, Erie, Pa.; Orient Fire, Hartford, Conn.; Newport Fire and Marine, Providence, R. I.; National Fire, Hartford, Conn.; Connecticut Fire, Hartford, Conn.; Atlantic Fire, Brooklyn, N. Y.; German American, New York, N. Y.; Alps Insurance Company, Erie, Pa.; Market Fire, New York, N. Y.; Lorillard Insurance Company, New York, N. Y.; Washington Fire, New York, N. Y.; New York and Yonkers Fire, New York, N. Y.

In addition to the 3 Boston and 17 companies of other States, suspended in consequence of their Chicago losses, four companies voluntarily withdrew from the State, viz.: Lancaster Fire, Lancaster, Pa.; Cleveland Insurance Company, Cleveland, Ohio; Lorillard Insurance Company, New York, N. Y.; Occidental Insurance Company, San Francisco, Cal.

As the net result of admissions and withdrawals, the number of companies now authorized to do a fire and marine business in the State is reduced to 183, or 12 less than at the close of the last report. Of these 98 are home companies, 79 are from other States, and 6 from Great Britain. The present local classification of those from other States shows that 48 are from the State of New York, 8 from Connecticut, 8 from Pennsylvania, 6 from Ohio, 4 from Rhode Island, 3 from Maine, and 2 from California.

FIRE AND MARINE EXPERIENCE.
Massachusetts Mutual Fire Insurance Companies.

Years.	No. of Companies.	Mean Amount at Risk.	Ratio of Losses to		Risks Written.	Ratio of Losses to Risks Written.	Ratio of Commissions &c., to	
			Mean Amt at Risk.	Prem. Receipts.			Risks Written.	Prem. Receipts.
1870.....	55	\$352,884,706	.15	32.6	\$134,487,691	.39	.35	29.16
1871.....	56	377,844,012	.13	27.5	153,191,846	.51	.26	22.43

Massachusetts Mutual Marine and Fire-marine Companies.—Fire Experience.

1870.....	8	\$8,280,558	.90	100.44	\$11,702,466	.63	.29	12.6
1871.....	1	5,232,836	.02	9.87	3,182,275	.04	.29	10.4

Marine Experience.

1870.....	12	\$30,479,947	2.71	61.17	\$51,005,652	1.62	.28	26.4
1871.....	11	21,478,300	6.10	140.29	81,272,807	4.19	.20	28.2

Massachusetts Joint Stock Companies.—Fire Experience.

1870.....	30	\$321,642,840	.72	70.1	\$353,286,453	.66	.32	28.7
1871.....	28	378,266,41	.81	79.7	417,780,998	.74	.28	26.4

Marine Experience.

1870.....	20	\$54,338,713	2.72	83.6	\$103,668,037	1.43		
1871.....	15	53,524,549	2.32	77.6	106,292,570	1.17		

Joint Stock Companies of other States and Countries.—Fire Experience.

1870.....	95	\$5,661,966,408	.47	57.8	7,265,682,449	.37		
1871.....	74	6,013,662,359	.70	85.8	7,440,794,600	.57		

Marine Experience.

1870.....	45	\$107,499,941	5.59	70.0	\$778,460,787	.63	.22*	33.0†
1871.....	34	192,650,559	4.88	68.1	1,052,411,322	.80	.20*	28.2†

* To fire and marine risks.

† To fire and marine premiums.

[Data of companies forced into liquidation by Chicago not included.]

TABULAR SYNOPSIS 1871.

Class of Companies.	Guarantee Capital.	Gross assets	Percentage of surplus or impairment, December 31, 1871.	Fire premium rate.	Ratio loss to			Excess or deficiency of income.	Cash dividends declared.	Ratio of expenses to premiums received.
					Fire premiums received.	Marine and inland premiums rec'd.				
Mass. Mut. Fire.....		\$5,722,339	.....	1.16	27.62	.....		+536,803	.....	22.5
Mass. Mut. Mar. and F.M.....	\$1,523,825	2,894,360	-12.0	.42	9.40	140.3		-481,996	.....	10.4
Mass. Joint-stock.....	7,447,000	17,949,981	74.8	.93	79.67	77.6		+226,331	\$1,060,488	24.4
Ins. Co's, other States.....	31,841,830	81,587,832	25.2	.98	90.70	69.0		+146,058	3,093,799	26.7
Foreign Fire Ins. Co's*.....	10,308,235	48,936,040	83.3	.37	60.23	.....		+1,897,675	1,674,685	31.7
United States branches.....			.....	1.19	112.25	.....			
Totals.....	\$51,115,890	\$157,141,152	44.0	.69	83.93	74.8		\$2,325,921	\$5,848,953	24.3

* For the year ending December 31, 1870.

Foreign Fire Insurance Companies for year ending December 31, 1870.

Name of Company.	Cash capital.	Surplus as regards policyholders December 31, 1870.	Risks written.	Premium rate.	Ratio loss to		
					Prem. receipts.	Risks written.	
Commercial Union (F.&M.).....	\$1,250,000	\$2,048,485	\$363,402,090	.60	57.8	.34	
Imperial (fire).....	3,500,000	4,175,055	719,145,350	.32	64.0	.30	
Liverpool and London and Globe	1,958,760	5,502,005	1,157,015,090	.40	56.7	.23	
North British and Mercantile....	1,250,000	3,936,660	845,455,345	.33	58.3	.19	
Queen (fire).....	899,000	1,389,030	236,012,000	.30	62.2	.18	
Royal (fire).....	1,445,475	2,348,890	772,573,000	.33	66.4	.22	
Totals.....	\$10,308,235	\$19,400,125	\$4,033,602,875	.37	60.2	.22	

Ratio of Assets to Liabilities.

COMPANIES.	1866.	1867.	1868.	1869.	1870.	1871.
Mass. Mutual Companies.....	237.33	196.21	168.60	234.11	245.17	209.88
Mass. Joint-stock Companies.....	450.62	340.92	879.77	410.43	431.82	363.87
Companies of other States, &c.....	296.93	333.52	209.73	285.94	319.90	197.27
Average.....	328.29	290.22	252.70	310.16	332.30	257.01

UNITED STATES BRANCHES—1871.

Foreign Fire Insurance Companies.

Name of Company.	Risks written.	Premiums received.	Premium rate.	Losses paid.	Ratio of loss to	
					Prem. receipts.	Risks written.
Commercial Union (F.&M.)....	\$21,172,215	\$201,298	.95	\$79,825	39.6	.38
Imperial (fire).....	139,561,225	1,214,464	.87	686,237	56.5	.49
Liverpool & London & Globe..	844,084,173	2,971,783	.86	4,861,845	146.8	1.27
North British and Mercantile..	160,286,844	1,377,445	.86	2,812,586	204.2	1.75
Queen (fire).....	*	707,006	.....	272,211	38.5	.....
Royal (fire).....	*	1,454,580	.....	684,725	47.1	.....
Totals.....	\$665,108,957	\$7,926,521	1.19	\$8,897,429	112.2	1.34

* Not reported.

During the year 1871 the fire and marine risks written in Massachusetts alone, by companies from abroad, amounted to nearly \$320,000,000, more than 10 per cent. in excess of the previous year. Their premium receipts on this portion of their business amounted to upwards of \$4,000,000.

Six companies from Great Britain are now represented in Massachusetts.

Of the \$8,209,199 of deposits and assets at market value held in ten States for the security of their American policyholders, the sum of \$7,874,008 (\$2,632,217 more than in 1870) is reported as immediately available for the payment of losses in Massachusetts; \$2,060,619 of the latter consisting of deposits with State departments, and \$4,681,134 being in the hands of trustees. A large portion of the gross amount is invested in United States securities and real estate, the remainder consisting of cash, temporary loans, and miscellaneous property.

All these companies report assets immediately available for the payment of losses in Massachusetts, the amount so held being considerably in excess of 1870; without including the Commercial Union, not then represented, but now reporting nearly \$350,000 available for that purpose.

It will be seen that the total amount of deposits and assets held for the security of all American policyholders, as reported to this department, is also largely in excess of 1870. This showing is particularly noticeable in view of the very heavy losses sustained by two or three of these companies in their Chicago business. The opposite result would have appeared, but for the heavy drafts cashed at their home offices for the payment of Chicago claims. The retention of their large premium receipts, \$3,000,000 in excess of the previous year, would make up the increase in assets, after paying all reported expenses.

The Massachusetts business of the foreign companies for 1871 is briefly indicated by the following figures: risks written, \$37,806,686, against \$23,261,129 in 1870; premium receipts, \$397,525, against \$219,186 in 1870. The largest single risks reported as written on property within the State, range from \$27,000 to \$90,000 each, all within statute limitation; and all reinsurances are reported as having been effected in companies duly authorized by this department.

The gross assets held by all the American branches at the close of 1871, including agents' balances and various contingent items unrealized, are stated at \$8,641,695, against \$5,948,407 in 1870; with gross liabilities amounting to \$5,041,803, against \$3,214,181 in 1870. This showing gives a surplus of \$3,599,892 for 1871, a gain of nineteen per cent.

over the previous year. The whole amount of the American risks written by the foreign companies in 1871, was \$907,737,403, against \$467,064,446 in 1870; with \$7,926,520 of premium receipts in 1871, against \$4,635,963 in 1870.

THE MONITOR MUTUAL FIRE.

The affairs of the Monitor Mutual Fire, of Boston, which went into the hands of a receiver, Mr. Win. G. Colburn, a year ago, were in so bad a condition that very little progress has thus far been made in their adjustment.

LYCOMING FIRE INSURANCE COMPANY.

The Lycoming Fire Insurance Company, of Muncy Pa., was admitted to the State in 1870 as a purely mutual company, the only condition under which it could comply with the statutes relating to companies of other States. Pending the necessary arrangements for a *re-examination* of its affairs at its home office, a year later, in consequence of suspected impairment, the Chicago fire suddenly precipitated an exposure which more than confirmed previous suspicions. In common with other companies involved at Chicago, the Lycoming was very properly required to furnish a statement of its financial condition. It did so, and by its own showing was in possession of cash assets amounting to only \$36,405.19, instead of the \$100,000 required from the companies of its class by the law of Massachusetts. These are the items as furnished by the company at the date referred to:—

<i>Assets.</i>	
Real Estate.....	\$5,000 00
Bonds (Catawissa 7 per cent.).....	10,000 00
Bond and mortgage.....	2,000 00
Cash in bank.....	19,405 19
Total cash assets.....	\$36,405 19
The only other admissible items were of a contingent character, and estimated by the company as follows:—	
Premiums due from agents.....	\$65,583 48
Office furniture, safes, &c.....	4,000 00
	69,583 48
Gross assets.....	\$105,988 67
<i>Liabilities.</i>	
Losses adjusted but not due.....	\$111,942 15
Claims in suit.....	16,650 00
Reinsurance fund, estimated by company.....	150,000 00
	\$278,592 15
Add reported losses, including those at Chicago, which had nothing to do with the revocation of the company's authority in the State.....	483,019 60
Total liabilities, as reported by the company.....	761,611 75
Impairment.....	\$635,673 06

Ratio of impairment exclusive of Chicago losses, 162.97 per cent.; including Chicago losses, 618.01 per cent.

With this showing, and the further developed fact that its business had been conducted in violation of the laws of the State, no alternative remained. But in order to save the company from all possible embarrassment, it was quietly and courteously requested to suspend business in Massachusetts till its financial condition could be restored to a proper footing. This reasonable request was defiantly and persistently refused, and consequently its authority to do business in the State was revoked without condition.

It is only necessary to add that the premium or deposit notes held by the Lycoming, and claimed as a portion of its assets, are of the same character as the premium or deposit

notes taken by some of the Massachusetts companies, and subject to assessment in like manner; and are in no sense recognized, but are, as they should be expressly excluded by law as an asset.

Two or three unincorporated associations known as the Maine Lloyds, United States Lloyds, and the New England Insurance Association, have been transacting the business of insurance in Boston, each complying with the law relating to such organizations. The New England took, in part, the business of the New England Mutual Marine, *supplementing* the latter till the new company, just incorporated, shall take its place. The United States has withdrawn, and the Maine Lloyds is now the only association of its class, from another State, which has any authority to write risks in Massachusetts.

OFFICIAL EXAMINATIONS, FEES, CHARGES, &c.

The credit of the commonwealth and the protection of her citizens are paramount interests in her insurance supervision, the integrity and usefulness of which should stand unimpeached and unimpeachable. Under no administration less pure and efficient should the existence of such a system be tolerated. Every statutory requirement affecting monetary and prudential interests should be scrupulously administered, both in spirit and purpose, as well as in details of lesser or greater magnitude.

In this connection it may be stated that official investigations of company finances have never been so important and necessary as during the past year. The number of companies whose financial condition required such service at their home offices has been unprecedentedly large. As the fees required for this service have been a matter of frequent inquiry, it is proper to add that the laws of the State very justly provide no personal fee or reward for its performance. In no instance is a fee charged or paid for any examination made under the direction of this department, except in the case of home companies commencing business, or of reorganization, or change of capital or assets by assessments or otherwise. The legal and only fee ever charged or paid in these cases is \$30, although the examination may occupy any number of days. These fees, with those required for filing statements and charters of companies admitted to the State, are paid into the State treasury. In examinations beyond the limits of the State, necessary travelling fares *only* are charged and paid; and whenever two or more examinations are made at the same time and in the same locality, these fares are equitably apportioned so as to relieve companies as far as possible from unnecessary expense. Though these details may be regarded as petty matters of finance, this explanation is volunteered simply for the information of the legislature, and for the purpose of relieving any misapprehension in other quarters.

Under a provision of the statute of 1871, identical with that of New York and some other States, the publication of the result of any examination is not required, unless deemed expedient or necessary for the benefit and protection of the public. An equitable and impartial observance of this provision could not be expected to commend itself to a class of "extortioners," who have unfortunately *barnacled* themselves upon the insurance interests of the country, apparently regarding an insurance department as a creation for their special benefit, and every insurance company as their legitimate prey. By their unscrupulous and criminal misrepresentation of facts gleaned from departmental and other sources, the reputation and security of the safest and soundest of companies are frequently placed at their mercy, and too often under tribute to their avarice; while, worse than all, the true interests of the insured are as often sacrificed or seriously impaired. It is presumed that every legislator will perceive at a glance that any company yielding a *farthing* to these blackmailing appliances becomes a party to the compromise of its own honor and credit, no matter how, or by whom, or under whatsoever guise they may be suggested. Of course every honorable advocate of legitimate insurance—every true conservator of insurance interests, whatever his position or profession, will heartily coincide

in this view. Only the guilty will cringe and denounce. It is proper to add that the experiences of this department during the past year have most signally confirmed the wisdom and justice of the statute of 1871, more especially in its measure of benefit and protection to policyholders.

The financial affairs of more than seventy companies, fire and life, have been personally investigated by the commissioner and his deputy during the year, and nearly one hundred more are registered for examination. In four of these examinations the law required a fee of \$30, which was collected and paid into the State treasury, no travelling expenses being required, as all were home companies: in fifty-nine others, travelling expenses were paid only as provided by law; and in the remainder no fees or travelling expenses were paid, none being required by law. The total fees and taxes collected by the department and paid over to the commonwealth during the two years ending December 31, 1871, were \$70,624 45, and its total expenditures were \$43,585.64—showing \$27,038.81 to the credit of the department. For many previous years, also, the same policy has been pursued, with about the same relative financial results.

FRAUDULENT AND UNAUTHORIZED INSURANCE.

It is creditable to the insurance legislation of this commonwealth that it sanctions the exercise of no unjust or arbitrary powers, while the protection contemplated by its enactments is in the main well secured. But with all the safeguards provided, and with all care and watchfulness in their application, unprincipled and dishonest men find means and opportunity for successful evasion; and citizens are constantly deceived and defrauded under the guise of pretended insurance.

In the same category with three or four Rhode Island and Connecticut companies, whose notorious financial weakness bars their admission to Massachusetts, may be named two or three irresponsible plate-glass and lightning-rod companies from other States, whose so-called insurance is simply a bold cheat. Their impositions are practiced chiefly through the agency of *runners* temporarily visiting the State, and in cases of loss, several of which have occurred, their policies have either proved worthless, or the expense of litigation necessary to be instituted in other States has compelled the abandonment of claims. In numerous instances the victims of these perambulating "wildcat" organizations have learned wisdom from costly experience. Citizens are again informed that this department holds itself in readiness to act, whenever information implicating parties in these fraudulent operations is furnished.

The illegal practice resorted to by some companies in appointing agents in various sections of the State, with instructions to commence business, even before filing application for admission, has demanded special injunction. Several instances have occurred in which the examination of companies thus operating proved them financially unworthy of confidence; yet agents acting without proper authority had induced neighbors and patrons to accept their worthless policies, sometimes for large amounts. Companies in process of organization in other States have taken this course, even before their capital has been paid in. Those who would escape such imposition and fraud should decline to deal with any person not holding the commissioner's certificate of authority, or to insure in any company not named in the certificate.

VERIFICATION OF ASSETS BY DIRECTORS.

The commissioner recommends a plan by which directors can test the statement of assets made by officers. Under its operation a special committee on assets, consisting of three members of the board of directors, are required to make, at irregular intervals to be determined by themselves, but at least as often as once a month, a critical examination of any part, or of the whole, as they may elect, of the assets of the company; the result of such examinations to be reported at each regular meeting of the board. It is further provided

that, upon its appointment, the committee shall divide itself into three classes, so that its members shall act for one, two, and three months respectively, the place of the retiring member to be filled by another appointment, at each regular meeting of the board.

—WITH a summary by Mr. Barnes, and an argument by Mr. Miller in his own defence, the investigation into the management of the New York insurance department closed, with a majority report of the committee submitted to the assembly, April 19th. This report embraces the whole testimony—extending over 1,200 printed pages—and the whole ground is gone over by the committee in a condensed review and resumé. The conclusion reached by the committee is that the three specific charges in the assembly resolutions against the superintendent are proved (reserving legal questions), and also that the general charge of “other irregularities” is sustained in respect to points enumerated.

The tone of the report is moderate and judicial; the judgment of the committee is not pushed to any extreme issue; and the general verdict is qualified in behalf of the superintendent by giving him the benefit of all the doubt that may exist in the case. The committee find as follows:—

In conclusion, your committee desire to say that, to their minds, it has been proved, among other things, to their entire satisfaction:—

First. That the said superintendent has received and appropriated to his own use the fee of one-fifth of one per cent. on transfer of securities, which he claims he is legally entitled to.

Second. That he has, without authority of law, received, and in some cases charged, for his own use, sums largely in excess of his legitimate expenses in making special and other examinations of companies, and that he has likewise received large sums in payment for his services in making such examinations.

Third. That he has allowed clerks in the department, who are paid regular salaries by the State, to charge and receive illegal and excessive fees for making special and other examinations.

Fourth. That he has appointed commissioners to make examinations who have received large and excessive fees, entailing great expense upon the companies.

Fifth. That the department has been so managed that many of the companies have believed it necessary to employ brokers and attorneys, who were known to be on intimate terms and favorites with the superintendent, to obtain examinations and protect the interests of their companies, and the payments of large sums for their personal influence in that behalf.

Sixth. That the testimony tends to show that he has received through H. G. Southwick, Jr., a commission of twenty per cent. on the printing of the insurance department.

Seventh. That he has withheld from the State treasury the fees belonging to the department, and which should have been paid into the State treasury within a reasonable time.

Eighth. That twenty thousand dollars were raised by seven companies for improper legislative purposes last winter to secure the passage of what was known as the Miller Life Act, a bill conferring extraordinary powers upon the superintendent, and that the superintendent was cognizant of the use thereof.

The evidence herewith presented is voluminous and instructive in more points than one.

Your committee have herein fully expressed their opinions upon the various points of this investigation without prejudice against the superintendent, and yet with a desire fully and fairly to represent the testimony. Possibly different individuals, equally honest, may arrive at different conclusions. The laws in relation to examinations of insurance companies are very lax, and abuses have grown up under them, which the legislature should at once correct by the passage of adequate and stringent laws, as suggested in the body of this report. Whether the superintendent has been guilty of intentional violation of law, and whether or not he should be removed from office, are questions which we leave to the consideration and wisdom of the house.

Two members of the committee dissented from the opinion of the majority. The majority, however, leave the decisive judgment on the administration of the department with the legislature, and for this final test Mr. Tobey offered the following:—

Resolved, If the senate concur, that George W. Miller be, and he is hereby removed from the office of superintendent of the insurance department, in pursuance of the provisions of chapter 335 of the laws of 1867.

Resolved, That the attorney-general, if in his opinion the superintendent is not entitled thereto, be and he is hereby requested to institute legal proceedings to compel the said superintendent to pay into the State treasury the fee of one-fifth of one per cent., provided by law to be paid by insurance companies on the transfer of securities, under the provisions of the supply bill of 1870.

—THE two New York certificates—the one actual, the other suggested—growing out of the department examination of the Anchor Life Insurance Company, deserve a not-to-be-forgotten place among the things, many and various, which come up in respect to the department examinations. The first is the one issued by the superintendent; the second is characterized as the one for which President Fisher “would have paid \$2,500,” but did not get it.

[No. 1.]

INSURANCE DEPARTMENT, ALBANY, April 1, 1871.

E. C. FISHER, Esq., President of the Anchor Life Insurance Company.

Dear Sir:—In reply to your inquiry as to the result of the recent examination of the condition and affairs of the Anchor Life Insurance Company of New Jersey, I have to say that such examination has satisfied me that the capital stock of said company was duly paid in and is safely invested, and that the company is solvent.

The condition of the company I consider such as to warrant its continuance of business in this State, and to justify the expectation of its continued success.

Very respectfully yours, &c.,

GEORGE W. MILLER, Superintendent.

[No. 2.]

INSURANCE DEPARTMENT, ALBANY, N. Y., April 3, 1871.

E. C. FISHER, Esq., President of the Anchor Life Insurance Company.

Dear Sir:—In reply to your inquiry as to the result of my recent investigation of the affairs of the Anchor Life Insurance Company of New Jersey, I have to say that a thorough examination has satisfied me that its funds are safely invested, its business equitably conducted, and its affairs managed with honesty and ability.

The condition of the company I consider such as to justify the expectation of its continued success, and to warrant the full confidence of its policyholders and the public.

Yours respectfully.

[Not signed.]

Note the \$2,500 difference.

—As succeeding the Chicago fire the last annual meeting was probably the most memorable in the history of the Liverpool and London and Globe Insurance Company. It was the thirty-sixth annual assembly of the proprietors, and the first instance in thirty years when there was occasion to report fire losses in excess of fire premium—the excess on the business of 1871 being \$235,774, after payment of fire losses to the amount of \$5,803,747—on Chicago account \$3,070,000. The premiums of 1871, viz., \$5,657,973, were nearly one million dollars (\$999,338) in excess of 1870 premiums, while the losses, apart from Chicago, exceeded those of 1870 but \$181,827.

Total life premiums of 1871; \$1,364,740—added to the life reserve \$573,660. For the beginning of the past and the present year the finances of the company compare as follows:

	January 1, 1871.	January 1, 1872.
Capital	\$ 1,958,760	\$ 1,958,760
Life reserve.....	11,480,855	12,054,575
Reserve surplus fund.....	5,857,865	4,225,643
Total assets.....	\$19,296,960	\$18,238,918

The year 1870 added \$1,000,265 to the reserved fund after payment of 30 per cent. dividend. In 1871 the loss on the fire business was \$1,470,250, as shown by the profit and loss account. This evinces that it takes about the reserve of a year and a half in ordinary years for the Liverpool and London and Globe to make good such a year's deficit as the unparalleled Chicago conflagration could produce. Such a thing as a necessity for calling upon the shareholders is scarcely within the bounds of possibility.

If not more than half a Chicago occurs, the year 1872 will obliterate all the present evidence of Chicago in the company's total of assets. This, however, is a matter which concerns the shareholders rather than the public. For policyholders on this side of the Atlantic, it is sufficient to know that the Liverpool and London and Globe as a fire company alone—putting aside the life department—is an office with a capital of \$1,958,760, and a surplus of \$4,225,643, or fire assets to the amount of \$6,184,403, and is good against any American fire peril short of such a calamity as would overthrow the entire fire insurance system.

—"In the case of *Paul vs. Virginia* it was expressly decided that a corporation was not a citizen at all, and also that a foreign corporation had none of the 'privileges and immunities' of a citizen outside of the State wherein it was created." The Kansas superintendent of insurance says this in his first annual report, but *Paul vs. Virginia* decides nothing of the kind; that decision accepts the principle which is the basis of the corporation, namely—that it cannot be a citizen, but it rather enlarges than restricts the functions of the body politic. Justice Field, in delivering the opinion of the court, admitted that the commercial clause of the Federal constitution applies to corporations as well as persons—admitted that a corporation can have inter-State rights, and the judgment against the insurance companies was in nowise owing to the fact that the companies were corporations, but was rather due to the theory that insurance, in respect to its contracts, is a local transaction, the contracts not "having an existence and value independent of the parties to them;" i. e., not being commodities, are not matters of inter-State commercial transaction. As a business rule, the theory is doubtless very superficial. Commerce is transmission of all values by all forms of purchase and conveyance; but, unfortunately, we are governed by political laws where economic forces should have unobstructed sway.

—THAT inadequate rates of fire premium will not cease to demoralize and peril our fire insurance security, so long as there is no actual valuation of the hazard resting upon proved ratio of fire liability, is a matter which we have frequently insisted upon. Any step towards supplying the existing deficiency we welcome, and therefore notice with pleasure the system of office registration brought forward by Mr. J. Griswold. It presents for registry 80 classes of risks, subdivided into brick or frame, each class to be followed up from original entry of respective risks to monthly and annual aggregated results of loss to premium, to amount written, the profit and loss as to each class, &c., &c., with the deductions therefrom, accompanied with itemized causes of fire loss—twenty specific causes recapitulated under five general heads—covering the inherent material and the personal hazard, and the hazard from contiguity. Mr. Griswold's plan is simple and compendious; the associated blanks afford facility to carry on the record of years, with annual summings up, with little labor and little bulk of paper.

—In the Supreme court of the United States, *Steinbach vs. the Relief Fire Insurance Company*—error to the Circuit court of the United States for Maryland—judgment of Circuit court affirmed, holding that fireworks are not within the general description (of insurance) of "articles in the line of business of a German jobber and importer"—i. e., not included as "specified" in such written description. Policy \$3,000, premium 40c., with "privilege to keep fire-

crackers on sale." Fire originated in fireworks kept for sale. Firecrackers classed as "hazardous, No. 2," additional premium 1/10c. per \$100; fireworks "specially hazardous," additional premium 50c. per \$100.

—THE gradual consolidation of the life business is proceeding as fast as the weak companies realize, through diminishing net resources, that the present circumstances of life insurance and the vantage-ground held by the stronger offices make competition with the stronger offices, at this juncture, upon equal grounds, next to impossible. Comprehending the situation, the stockholders of the *Atlas Life*, of St. Louis, decline to put up additional capital to supply the deficit in the reserve, and the company's risks will be transferred to the *St. Louis Mutual Life*—an arrangement which, in view of their improved position, is a matter upon which the policyholders can congratulate themselves.

—THE *Hercules Life*, of New York creates a small sensation. Trustee Pomeroy, chairman of auditing committee, who says that two years ago, under the presidency of James D. Keymert, the company was prosperous, telegraphs to Sup't Miller that the Herculean affair cannot pay its debts, and that he wants somebody to take charge of it. S. D. Sowards, now president, expresses the contrary opinion. The small re-insurance reserve and debt liabilities are doubtless covered by the \$100,000 deposited at Albany.

—JUNE 1st the *Mutual Life Insurance Company* of New York will take possession of its lately purchased property, north-west corner Tenth and Chestnut streets, Philadelphia, to begin the erection on that site of the new building for its important Philadelphia agency. The ground now occupied by the old Keene mansion, built in 1811, is 53 feet on Chestnut street, and 178 on Tenth street.

—MINNESOTA Supreme court holds that the receiving of a note from the person making the application, by an agent of the company, for a part of the first premium has no tendency to show a delivery of the policy, actual or constructive, or any intent to give effect to the same as a contract.

—WELL received wherever it goes, the *Browers' Fire*, of Milwaukee, is extending its agencies east and west. Branch offices are to be started in New York, Pennsylvania, Kentucky, Michigan, and Indiana. The Philadelphia agency is in charge of Messrs. Carstairs & Paulding.

—MR. J. R. DAVENPORT, formerly having charge of the marine business of the *Phoenix*, of Brooklyn, and a well-qualified marine underwriter, withdraws from the *Phoenix* to become manager of the inland marine department of *Prindle & Mangam's* agency.

—WE have received from office of Baltimore Underwriter a pamphlet copy of the newly amended Maryland insurance law. The law contains some noticeable features, and we shall endeavor to seize upon some early occasion to refer to them.

RAILWAYS AND TRANSPORTATION.

THE situation and prospects of the Erie railroad have continued to fix public attention since our last issue, and the developments go to show that the English public were so fully informed in regard to what was going to happen that a full detail of the plan, as finally carried out, was published in the London papers fully a week before anything was done or publicly known here.

On the 20th of March Gov. Hoffman approved a bill repealing the notorious classification act, and providing for the election on the second Tuesday of July next of a new board of directors, and specifying among other things, that the inspectors of such election shall be designated by the court of Appeals, that the transfer books of the company shall be open for the examination of stockholders until the second Monday of June, and a final provision (introduced after the change of management) that no officer of the Atlantic and Great Western Railroad Company shall be eligible as a director of the Erie road. The last provision has justly provoked considerable unfavorable comment. It would seem to be trenching upon the rights of the stockholders, to say that they should or should not elect any one they may choose as manager of their property. The difficulty heretofore has been, not solely that this or that man has had control, but that only a bare majority were represented and the rights of a very large minority entirely ignored, and this may happen again as well under the present or future as any former management. Even if the law is constitutional, which is a matter of doubt, it will be practically useless. The question which arises not only in this case, but from the multiplication of large corporations in many cases, is how to give each fraction of the stockholders a representation in the directory, and the laws governing corporations in any state will not be complete until this question is solved.

Since our last issue Mr. Gould has resigned his seat in the directory, and the new executive committee have issued a statement of the financial condition of the company. This gives the capital stock and funded debt as \$112,995,210, besides \$3,386,000 of consolidated mortgage bonds issued but not sold. Of this \$78,000,000 is common stock and \$3,536,900 preferred stock, and the remainder bonds of various classes. It has securities in the treasury estimated worth \$6,174,100, part of which are collaterals for loans. The committee further report that the earnings of the road since the date of the last report, (October 1st, 1871,) have been at the rate of \$22,000,000 yearly, instead of \$17,000,000, the amount reported for the previous year. This includes the operation of leased lines, the rentals of which require \$1,117,000. The interest on the bonded debt will absorb \$1,855,000, leaving—supposing the receipts to come up to the estimates—about \$19,000,000 for running expenses and dividends. This would be doing very well, much better, in fact, than the road has ever done. The largest net earnings of any year were those reported last October, and when we recollect that the conspicuous fault of the late management was not in not getting the largest desirable amount of business, but in extravagant expenditures, we must think that the prospect of suddenly increasing earnings to the amount proposed is not very good.

The operating expenses of the road have heretofore averaged about 70 per cent. of the earnings, and it is impossible to say how much they can be reduced until it has been tried; but having in our mind several roads upon which the experiment has been made, and the complete success which attended the efforts of the managers, (among which may be mentioned that of the Union Pacific last year,) and the popular belief that the expenditures of the Erie have been heretofore extravagant, we look more hopefully on this than upon attempting to greatly increase the income apart from natural growth.

The average income of Erie stocks for the past twelve years is said to have been less than three-tenths of one per cent. per year. Financially the road is weighed down by seventy-five per cent. of fictitious stock, making the capital account at the rate of more than \$240,000 per mile.

—On the first day of April last the first annual meeting of the stockholders of the American Steamship Company was held in Philadelphia. The annual report was read, from which we condense the following:—

The list of subscriptions to the capital stock of the company amounts to 7,047 shares at \$100.00 each; amount paid up on these subscriptions, \$696,020.00, leaving a balance unpaid of \$8,680.00. Contracts have been made for four first-class iron propellers of 8,016 tons burden, old measurement; each to be built as far as possible of American materials. They are to be arranged to carry each 75 first-class and 854 steerage passengers, and the total cost of the four to be \$2,080,000.00. The vessels are to be completed on the 1st of September, November, December, 1872, and 1st of January 1873 respectively, one of them expected to be launched in June next. The treasurer's report is as follows:—

Cash received on account of instalments of stock.....	\$696,020 00
“ “ “ subscription bonds.....	1,358,000 00
“ “ “ interest.....	3,175 92

Total receipts.....	\$2,057,195 92
Paid Wm. Cramp & Sons, to date.....	617,500 00
Deposited with Pennsylvania Railroad Company, to secure company's contract with the builders.....	1,420,500 00

No plan has yet been adopted as to how the business of the company will be conducted, though the suggestion has been favorably received that the company attend to its own business at Philadelphia, while at Liverpool the aid of a long established firm in the American trade should be secured at some fair rate of compensation.

The meeting decided to increase the number of directors to eleven, and an election was held, resulting as follows: President, Herman J. Lombaert; Directors, Edward C. Knight, Washington Butcher, Josiah Bacon, John Rice, B. H. Bartol, John Price Wetherill, Henry D. Welsh, D. B. Cummins, Samuel T. Bodine.

—THE Pittsburgh, Fort Wayne and Chicago Railway Company own and lease 500 miles of railways, all of which is operated by the Pennsylvania company. The annual report of the president to the stockholders and bondholders shows that while the road has been managed in a manner entirely satisfactory to the lessors, it has also proved profitable to the lessee. We collate the following:—

Earnings of Pittsburgh, Fort Wayne and Chicago railway.....	\$3,393,973 86
“ “ New Castle branch, (15 miles long,).....	288,976 53
“ “ Lawrence “ (17 miles long,).....	139,055 36
Total.....	\$3,822,005 75
Expenses of Pittsburgh, Fort Wayne and Chicago railway.....	\$4,347,329 55
“ “ New Castle branch.....	101,873 55
“ “ Lawrence “.....	61,896 58
Total.....	\$4,511,099 68

The increase in earnings for the main line over the previous year was \$611,370.73, about 8 per cent. While the increase in expenses was only \$119,264.57, about 2½ per cent. The increase in earnings on the branch lines was \$53,226.52, or 14 per cent., and the increase in expenses was \$19,937.58, or 13 per cent. The result to the lessee exhibits a large profit after paying *all* expenses. The report further shows that several connecting lines are being pushed rapidly to completion, among which the Grand Rapids and Indiana, the Peninsula, and the Plymouth, Kankakee, and Pacific railroads are most important. These roads are expected to bring a large increase of business. The latter road, from Plymouth (84 miles east of Chicago) to Bureau Junction, on the Rock Island road, a distance of 167 miles, will, when completed, be by far the shortest route from Pittsburgh to the eastern terminus of the Union Pacific. One million four hundred thousand dollars of stock has been issued by the directors to the lessee to reimburse them for the actual expenditures in the permanent improvement of the road, and addition to equipment, from July 1, 1869, to December 31, 1871, a period of two years and a half, being equivalent to adding \$146,666 of new capital per month.

—We condense from the official report, the following summary of the operations of the Illinois Central railroad during the year 1871:—

Length of line operated by the company, owned and leased, 1,109 miles, of which 705 miles are located in Illinois, and 404 miles out of that State.

Earnings of the line in Illinois.....	\$7,052,440 46
Working expenses and State tax.....	4,280,523 25

Net earnings.....\$2,771,918 21

The earnings of the leased lines in Iowa were \$1,848,701.35; working expenses, taxes, and rents, \$1,387,772.12; showing a deficit of \$39,070.77 in working the Iowa lines, and reduces the net earnings of all the lines operated by the company to \$2,732,847.44, against net earnings in 1870, \$2,857,321.80—a falling off in 1871 of \$124,474.36, making the proportion of expenses and taxes to gross earnings 61 per cent. The capital account shows, capital stock, \$25,280,510.00; cancelled bond scrip, \$16,370.00; bonded debt, less construction bond fund, \$5,764,500.00; bonds delivered land department, less in the hands of trustees, \$13,299,000.00, making the company's property represent \$44,300,380.00. The land department, however, has credits more than sufficient to cancel the entire issue of construction bonds, thus leaving the entire net earnings applicable for stock dividends, about 10 per cent. As the company lost heavily, not only in property, but in business, by the Chicago fire, this is, on the whole, a favorable exhibit—the earnings of the Illinois lines being a trifle less than \$10,000.00 per mile.

—THE annual report of the Catawissa railroad shows the earnings during the year past to have been \$634,328.37 (being \$10,066.44 per mile of road). Working, maintenance, and general expenses, \$453,466.12 (about 69 per cent). These results are not quite equal to the preceding year, owing to the strikes of the coal miners, and the drought interfering with the shipment of timber. The most important event of the year is the completion of the road to Williamsport as originally intended. The officers also congratulate themselves that there has been no accident whereby property was damaged to any serious extent, and no accident to the injury of any passenger train during the year.

—THE Baltimore and Potomac railroad is being pushed rapidly forward, and will be completed early in June, and when finished it will constitute the connecting link on direct lines between New York and Pennsylvania and the south. The principal obstacle which has heretofore stood in the way of this direct connection, was the Baltimore and Ohio railroad, but this has been finally overcome, the finishing stroke being given before the congressional committee who assembled to hear the arguments *pro* and *con* about the privilege of erecting a depot in Washington. Col. Scott and Mr. Garrett appeared personally before the committee, and each argued his side of the question with

signal ability; but the committee evidently thought Col. Scott had the best of the argument, they deciding to report favorably upon the proposition to erect the depot, and as Col. Scott proposed to construct the depot as soon as possible, that part of the work will probably be ready as soon as the lines really require it.

—THE South Improvement Company, instead of swallowing the oil refining and producing interests, has itself come to grief and been swallowed by those interests; and the oil men, taking advantage of the excitement in the oil regions, are making vigorous efforts for the construction of railroads from Titusville to Erie and Buffalo. The latter road is already being surveyed, and it is reported that a practicable route has been found where the grade will not exceed 35 feet per mile, and if the excitement can be kept up a short time longer, will undoubtedly be built. The railroad interests, seeing the excitement must injure business if allowed to continue, did much to allay it by meeting the oil men in convention, and agreeing upon a reasonable tariff of prices to be charged hereafter, and meanwhile the South Improvement Company has been "investigated" by a congressional committee, and the charter repealed by the Pennsylvania legislature.

—THE Delaware, Lackawanna and Western railroad has been consolidated with the New Jersey Central, and as the new company controls 972 miles of railroad, including two complete lines from the Hudson river to the Delaware, a great system of roads in the anthracite coal regions, and a complete line from Oswego to New York, it is probably strong enough to get its share of the through freighting business, although from the location of its lines, it is probably intended to operate more immediately upon the coal traffic. This is rendered the more probable from the fact that rumors have been rife for several weeks that the Lehigh Coal and Navigation Company intend leasing their franchises to this new company.

—THE consolidation of the Memphis and Little Rock, and Little Rock and Fort Smith railroads has taken place, and these two roads, in connection with the Memphis and Charleston railroad, will be known in future as the Memphis, Little Rock and Pacific railway. This road will be continued from Fort Smith through the Indian territory, and connect with the Atlantic and the Pacific on the thirty-fifth parallel, thus opening a new road to the Pacific, or rather one link in the connection. That portion of this great and important highway between Memphis and Little Rock is already in running order, and also fifty miles beyond Little Rock towards Fort Smith. The remainder of the line to Fort Smith is almost entirely graded and bridged, and is contracted to be finished by the first of January next, at which time it goes under the control of the Southern Railway Security Company, of which the master-mind is Col. Thomas A. Scott.

—AT a recent meeting of the board of directors of the Lehigh Valley Railroad Company, it was resolved to increase the capital stock one-third—the object being, it is said, to in part raise the funds for building their proposed new road from Easton across the State of New Jersey to New York. The present capital of the company is about \$18,000,000, and the new issue is to be divided among the present stockholders at par, in the proportion of one share to every three held, to be called in such instalments that in effect the shareholders have the option of taking stock in place of dividends for the next three years.

—IT is stated that the Philadelphia, Wilmington and Baltimore, and Delaware and Pennsylvania railroad companies have joined in the purchase of a tract of twenty-three acres of land at the intersection of the two roads, near Newark, N. J. This comes connected also with a rumor that the shops of the Philadelphia, Wilmington and Baltimore road are to be moved from Wilmington to this new purchase, and that Newark is to become the head of the Delaware and Pennsylvania railroad, instead of Wilmington.

PATENTS, ARTS, AND SCIENCE.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Del.]

AT a recent meeting of the Society of Arts of the Massachusetts Institute of Technology, Dr. S. Dana Hayes read a paper on the history and manufacture of petroleum products, which contains information of the most interesting character, and which mentions with merited approbation the pioneers in this important branch of technology. The first coal oil manufactured in this country was distilled by Mr. Luther Atwood, in Waltham, Mass., in 1852. It was made from coal tar and was used for lubricating purposes; picric acid, benzole, and other substances were collected from the residual products. In 1857 Mr. Joshua Merrill, of the Downer kerosene oil works of Boston, commenced the manufacture of lubricating oils from the Albert coal of New Brunswick. In the autumn of that year six retorts were in operation, having a capacity of 1,200 pounds of coal each, producing 360 gallons of crude oil in twenty-four hours. The number of retorts was soon increased to fifty, and the annual yield to 900,000 gallons of crude, or 650,000 gallons of refined oil.

In observing the operation of distillation, it was found that a number of light-colored hydrocarbons came over during the early stages of the process, which had too little body to be of any value as lubricating agents, and for a time efforts were made to prevent their appearance. Investigations, however, having shown that these thin oils possessed valuable properties as illuminating agents, no further steps were taken to avoid their production. Illuminating oil was first prepared from Pennsylvania petroleum in 1858, and two years later there were fifteen refineries in the United States engaged in its distillation. The great cheapness of this natural oil, and the facility with which it could be utilized, led to the abandonment of Albert coal in 1865. Experience in the use of petroleum soon proved that it could be "cracked" into thin hydrocarbons much more readily than the Albert coal, and that the process could be so modified that nearly the entire contents of the stills could be converted into illuminating oils or other marketable products. Dr. Hayes enumerates nine distinct products of distillation, as follows:—

<i>Name.</i>	<i>Specific gravity.</i>	<i>Boiling point.</i>
Rhigolene.....	.625	65° Fah.
Gasolene.....	.665	120° "
C. Naphtha.....	.706	180° "
B. Naphtha.....	.724	220° "
A. Naphtha.....	.742	300° "
Kerosene oil.....	.804	350° "
Mineral sperm oil.....	.847	425° "
Neutral lubricating oil.....	.883	575° "
Paraffine.....	.848 (?)	575° "

Of these bodies rhigolene is the lightest of all known liquids. So rapidly does it evaporate, that it reduces the temperature to 19° Fahrenheit below zero in twenty seconds. On

account of this property it has been used to a limited extent to produce local anæsthesia in surgical operations. The mineral sperm oil, which was introduced by Mr. Merrill, is one of the safest and purest illuminating agents known. It is almost wholly without odor, and does not give off an inflammable vapor below 800° Fahrenheit, and while it is more expensive than the commoner varieties of kerosene, its greater safety fully compensates for its cost. Dr. Hayes estimates that the crude and refined petroleum exported from the United States in 1871, at the low average of twenty-five cents per gallon, amounted in value to nearly \$35,000,000; and this is independent of the quantity used in the country, which is very large.

—THE universal cheapness of paper compared with cotton, linen, and woollen fabrics has led to a long-expressed desire to utilize it in the manufacture of articles of clothing. Barbarous and semi-civilized nations have long employed paper clothing. Collars, cuffs, frills, and a variety of minor articles made of paper, have been introduced and successfully manufactured in this country and in Europe, but the introduction of paper cloth as a material for dress goods has hitherto seemed unattainable. An invention has been recently introduced in England, which is said to be a success, and by means of which a fabric combining the essential conditions of strength, durability, and cheapness has been manufactured. It is described as being a mixture of various animal and vegetable substances, the former being wool, silk, and skins, while the latter consists of flax, jute, hemp, and cotton. These substances are all reduced to a fine pulp, bleached, and then felted by means of machinery. The mixture of these several materials is said to produce a fabric of wonderful flexibility and strength, which can be sewed together either by hand or by a machine, and which makes a seam as strong as that of woven cloth. This paper is said to be of a very serviceable nature. It has been made into table-cloths, napkins, handkerchiefs, curtains, pantaloons, shirts, and other articles of dress. Petticoats have been made from it of very elaborate design, and when printed or stamped, they bear so close a resemblance to handsome cotton and linen goods as to make it difficult to discern the difference. The stamped open-work skirts display a delicacy of pattern which would be difficult to imitate with any ordinary skill with the needle. Imitation blankets and chintz for beds, furniture, or curtains are also made very cheaply, while embossed table-cloths and figured napkins made of felted paper so closely resemble the genuine damask linen as to be palmed off upon unsuspecting persons for the genuine article. We are not informed, at present, of the relative cost of these paper fabrics, but it is evident that an industry which will develop into large proportions has been inaugurated. From the abundance and cheapness of the raw material, the manufactured goods ought to be furnished at a moderate price, compared with woven goods, and if so, the invention promises to be one of great and permanent utility.

—APPLICATIONS of science to the useful arts have been but seldom made by persons discovering the principles which are involved in their utilization. This fact is happily mentioned in a Short Lecture on Chemistry, by Prof. Charles A. Joy, of Columbia college, in the Journal of Applied Chemistry, who thus refers to the subject: "Carbolic acid was discovered nearly forty years ago, and yet it is only recently that it has been largely applied in the arts. The same remark is true of creasote, hydrate of chloral, ether, chloroform, aniline, spectrum analysis, and many other important improvements in the arts, the theoretical basis of which has been known for years, but the practical adaptation is of recent date. Whenever a new fact is added to our knowledge by some industrious chemist, we never know to what important uses it may some day be applied. De la Rive noticed the disposition of copper on one of the plates of the battery, and Jacobi carried the discovery farther, and gave us the electrolyte. Henry rang a bell in the Albany academy by means of a magnet that he had invented. Out of this simple fact has grown the magnetic telegraph. Faraday found benzole in the gas condensers of his day. No one thought much of this apparently insignificant discovery; but since his time, millions

of money have been invested in its production, and a vast progeny of colors has sprung from it." These few instances serve as types of a large number of similar occurrences, and show that the practical application of principles to useful purposes which constitutes an invention, is not restricted to experts in science. This fact is borne out by the daily experience of professional scientists, who are often consulted by persons who have conceived the application of certain principles to the demands of industry, but who need instruction and counsel as to the proper method of putting them in practice. And this by no means detracts from the merit or originality of the application. Had chemical inventions been restricted solely to professors of the science, many of the most important arts characteristic of the age would yet remain unknown and unpracticed.

—PHYSIOLOGISTS have constructed various theories regarding the action of alcoholic stimulants when taken into the system. Dr. Lees, of England, who has devoted many years to the study of the effects of alcohol, has long held the opinion that it is utterly foreign to the human body and its normal wants—"one that never gives power like food, nor aids the circulation like water, nor produces heat like oil, nor purifies like fresh air, nor helps elimination like exercise;" and among other conclusions he declares that it lowers animal heat. Dr. Richardson, F.R.S., in his fourth report to the British Association on the Action of Methyl Compounds, published some time ago, remarks that "alcohols taken into the body do not enter into any combination which changes their composition, but pass out of the body, chemically, as they enter it, and the evolution and the time of their evolution is the mere matter of so much expenditure of force—caloric—to raise them and carry them off." Many opinions similar to the above have been expressed by other physiologists of eminence, while authorities of fully equal reputation have held opposite views. Dr. Dupré, lecturer on chemistry at the Westminster hospital, has recently read a paper before the Royal Society on the Elimination of Alcohol, in which he controverts the opinions promulgated by certain French physiologists, that alcohol when taken into the body is not consumed or assimilated, but is passed off, scarcely altered in quality or diminished in quantity. Dr. Dupré's experiments lead him to embrace a diametrically opposite opinion, and he concludes that the quantity of alcohol actually eliminated by the breath, and in other ways, is but a minute fraction only of the whole amount which has been swallowed. This looks very much like a return to the theory advanced by Liebig, many years ago, that alcohol when taken into the body is for the most part oxidized; or in other words, that it is converted into heat and force, thus fulfilling, in part at least, the function of food. But Liebig's conclusion does not by any means warrant the assertion that the indulgence in alcoholic stimulants is beneficial.

—As a substitute for leather, enamelled cloth is largely used for various purposes, and on account of its relative cheapness its employment has greatly extended. For covering carriage tops, travelling bags, trunks, cushions, and for various other purposes, it has proved a valuable material, and a large capital is invested in its manufacture. It is prepared by coating cotton cloth with a composition composed of oil, rosin, lampblack, and other ingredients, which are boiled together until about the consistency of tar. In receiving this coating, it is passed through a machine across and between large iron cylinders, from one of which the composition is applied, something like the manner in which printing ink is furnished to the types from a roller. From between these cylinders the coated cloth is wound upon a large wooden frame, resembling in shape an old-fashioned reel, with spokes or arms so arranged that each layer of cloth is kept separate, so that the coated portion never comes in contact with another surface. This frame with the cloth wound about it is passed into the "heater," where the composition is rapidly dried; when it is worked by hand by being sprinkled with water and rubbed with pumice-stone, by which treatment all lumps and roughness are removed, and a uniformly even surface attained. This operation of alternate heating and rubbing is performed as often as necessary, or until the cloth has assumed the requisite thickness, when it is finished by being

passed through another machine which imparts the "grained" appearance, resembling that of morocco leather. Some varieties of enamelled cloth are finished with a plain, polished surface, but in the greater part of it the grain of leather is imitated—sometimes so as to almost defy detection.

—LEGISLATION to regulate the sale of petroleum illuminating oils has been incited by the numerous accidents which have occurred in all places where they have been used. Such enactments have been passed by many of the States, some of which have sufficed to curtail the traffic in these oils, while in others the ordinances have been so drawn as to be almost wholly inoperative. Our attention has been recently drawn to this subject by a very elaborate report made by Prof. C. F. Chandler to the Board of Health of New York, in which the subject is treated with the ability characteristic of its author. Following an historical introduction, Dr. Chandler devotes a number of pages to the discussion of the composition of petroleum and its chemical relations, including a most thorough account of the process of refining the crude material, with directions for making a safe oil. The rate of consumption and illuminating power of different oils is explained, and the relative cost compared with gas at three dollars per thousand cubic feet is shown.

Included within the pages of this treatise is an expose of the manner in which many manufacturers, tempted by cupidity, allow benzine to run into the oil tank, whereby a highly dangerous product is obtained, which, sold under various brands, has caused so many accidents, destructive alike to life and property. The empirical nostrums compounded of benzine, together with roots, salts, gums, &c., which have been sold throughout the country under various names—all of which are highly explosive—receive merited condemnation, while the character of the vapor lamps and stoves in which these death-dealing compounds are burned is fully explained.

In addition to the technical information given by Dr. Chandler, a complete resumé of the ordinances regulating the sale of petroleum oils by the different States is appended, together with a full discussion of the question of what action is deemed necessary to protect the public from dangerous oils.

—In looking over the lists of schemes for new companies, published in the English journals, it is really amazing to see the chimerical nature of some of the projects, and to notice the effrontery with which the most absurd propositions are made for the employment of capital. Among a number of similar adventures, a prospectus is now being circulated for the purpose of obtaining subscriptions to the stock of the Huano Manure Company, (limited,) having a capital of £400,000, in 40,000 shares of £10 each. The object of the company is "to purchase and work a contract with the corporation of Salford, for the night-soil and *ashes* of the town, held by Mr. W. H. Hughan, patent manure manufacturer of Salford; the works erected for executing the contract, and the English patents of Mr. Hughan for treating night-soil, sewage, and other matters by cementation." The value of this process is highly lauded, and great claims are made that if it be universally adopted, "there will be no longer any fear of poisoned and polluted wells and rivers, and no danger of fevers and other diseases arising from foul and insufficient sewage." On reading the extraordinary expectations held out by the promoters of this company the remark is irresistible: "In the name of the prophet—figs!" According to the census of 1861, the population of the town of Salford, which is a suburb of Manchester, was 102,414, and how the utilization of the excreta of this small number of inhabitants, together with the sewage of the town, will ever enable the company to pay interest on a capital of \$2,000,000, is a problem which disappointed stockholders will soon have an opportunity of solving. However desirable it may be in a sanitary point of view to prevent the pollution of streams and wells, we fear that the application of Mr. Hughan's patent will hardly accomplish the results he claims for it.

—SPONGES when first gathered are much discolored, besides being largely contaminated with carbonate of lime, and sometimes siliceous matter, which imparts to them a

rough and gritty feel. The sponges ordinarily met with in commerce are procured chiefly from the Mediterranean and from the Bahama islands, where they are obtained by diving. The finest qualities are washed several times in water, and immersed in dilute hydrochloric acid, whereby the calcareous matter is dissolved out. They are then repeatedly washed in pure water, until the last trace of acid is removed, when they are bleached by being placed in a bath of dilute hydrochloric acid, to which six per cent. of hyposulphite of soda dissolved in a little warm water has been added. They are allowed to remain in this bath for twenty-four hours, by which treatment they are bleached to an almost snowy whiteness. Subsequent rinsings and drying complete the operations. The commoner varieties of sponge, such as are used for washing carriages and harness, are chiefly obtained in the Bahamas. When taken from the water they evolve a sickening, disagreeable odor, which by reason of speedy putrefaction of some of the constituent parts of the living sponge, becomes exceedingly offensive. In order to remove this they are buried in dry sand, and after the putrefaction has ceased, they are exposed in wire cages to the action of the tide, by which they are sufficiently washed to fit them for export. The finest sponges are shipped from Smyrna, where their preparation and sale constitutes an important branch of business.

—A NEW arrangement of a copper and zinc battery has been devised by L. Kohlfurst, which it is stated, if used for ringing electric bells, give a sufficient current for a year at an expenditure of one and-a-half pounds of crystals of blue vitriol. A truncated hollow cone of copper, closed at the top, forms the negative plate. This cone is thoroughly protected by varnish inside, filled with crystals of blue vitriol, and placed mouth downwards in a glass cylinder deeper than itself. This cone has notches around the rim, and has a small hole in the centre of the top. The positive pole is a thick cake of zinc, suspended over the face of the cone, cast with a hole in the centre, through which passes a gutta-percha covered wire, making the connection with the copper side of the battery. The glass cylinder is then filled with water, when it is evident that the rate of solution of the blue vitriol depends upon the facility with which it is dissolved by the access of water through the notches in the cone; and this taking place at a uniform rate, the electric current arising from the mutual action of the copper and zinc in a solution of a given strength, will also be uniform. If a solution of common salt or sulphate of magnesia be used, the strength of the current is increased.

—PHYSICIANS in prescribing for diseases generally avoid the mixture of incompatibles, or those substances which by being brought together would produce precipitates not intended to be dispensed. But recently, in England, pills which had been compounded by direction of a medical practitioner, exploded about the person of the patient with exceedingly unpleasant consequences. These pills were composed of one-half grain nitrate of silver, one-sixth grain extract of *nux vomica*, one-half grain muriate of morphia, together with *cons. ros.* and extract of gentian.

—BENZOIC chloride has been proposed by M. Berthelot as a reagent for determining the presence of alcohol. In the presence of water this compound is decomposed with extreme slowness, even when warmed; but if alcohol be present in the water, benzoic ether is formed, which when a drop or two of the solution is heated with an aqueous solution of caustic potassa, eliminates the odor of benzoic acid, by which its presence may be readily recognized.

—A NEW concentrated disinfectant is announced by Prof. Gangee, which consists of alcohol impregnated with sulphurous acid gas, of which the liquid will absorb three hundred times its own volume. The concentrated nature of this compound admits of its being extensively applied in a much more convenient manner than a resort to the fumes of burning sulphur. Prof. Henry Wurtz throws out the suggestion that this liquid may be a very serviceable material for bleaching.

INDUSTRIAL INTELLIGENCE.

—A LEAD PENCIL is in itself a small affair, but considered as a manufactured product it rises into much importance. To start a first-class factory, with improved machinery and stock of well-seasoned wood, requires a capital of about \$100,000; ground covered, about half an acre, chiefly occupied by drying houses for the storage of red cedar. The Florida red cedar is mostly used in this country and in Europe—some “iben” wood, as the Germans call it, or English yew, is used in Germany—white pine is occasionally used for a common grade of carpenters’ pencil.

The “lead” of the pencils is the well-known graphite or plumbago; the best of this is the natural, found in a pure state in masses large enough to cut into strips. Of this there is but one mine now up to the standard, which is in Asiatic Siberia, and pencils made from this graphite are all one grade, and pay here 50 cents per gross special, and 80 per cent. *ad valorem* duty. The Cumberland mines in England were the first discovered, but are now almost exhausted. What was formerly refuse in cutting the graphite is now ground, cleaned and refined, and then mixed with a fine clay.

In mixing the clay and graphite great care must be taken in selecting and cleaning the clay and getting the proper proportions; the mixture, with water, after being well kneaded, is placed in a large receiver and strongly compressed and forced out through a small groove at the bottom, in the shape of a thread, of the thickness and style required—either square, octagon, or round. This thread, or lead wire, is cut in bars of the proper length (done by little girls,) and then straightened, dried at a moderate heat, and packed in air-tight crucibles and placed in the furnaces; the grade of the lead depends upon the amount of heat it is exposed to, the amount of clay used in mixing, and the quality of the plumbago. The coloring of the lead is by various pigments.

The wood after being thoroughly seasoned is cut in thin strips and dried again, then cut into strips pencil length. These strips are grooved by machinery, then carried on a belt to the glueing room, where the lead is glued in the groove, and then the other half of the pencil glued on. After being dried under pressure they are sent to the turning room and rounded, squared or made octagon, by a very ingenious little machine, which passes them through three sets of cutters and drops them ready for polishing or coloring—the former is done on lathes by boys, and the latter by a machine which holds the brush and turns the pencils fed to it through a hopper. After the pencil is polished, it is cut the exact length by a circular saw, and the end then cut smooth by a drop-knife, the pencil resting on an iron bed.

The stamping is done by a hollow die, which is heated; the gold or silver foil is then laid on the pencil which rests in an iron bed, and the die is then pressed on it by a screw lever. The pencil is then ready to go to the packing room, whence they find their way to all parts of the civilized world, at prices ranging from two dollars to twenty dollars per gross.

—THE perfection of leather belting receives attention as a requisite for the right working of machinery, as a safeguard against accidents, and a preventive of irregular action. If the driving gear which connects the engine with the shafting and pullies is not of the best kind there will be constant loss of power and injury to the machine and the quality and quantity of the work. The Eagle belt works of Clark & Slemmer, Philadelphia, aim at the perfection of leather belting. This establishment is careful to use none but superior oak tanned leather, which is stretched to the utmost by hydraulic power so as

to remain true under any tension. Cementing, rivetting, stitching, or pegging is made to assume all the unity of continuous material. These works were commenced in 1862, and a tannery was added in 1865. The hide is curried or cleansed, well soaked and shaved of the flesh; soaked again, and scoured by a "stone," then dried partially and stuffed with dubbing until soft and pliable; next cut into proper widths and dried, after which it makes its appearance in the belt room, where the edges are straightened, the ends "lapped," and then cemented together and pressed down by a pressure of twenty tons until quite dry. The Eagle belt works cut up one hundred sides per week, which make nine hundred square feet of belting, ranging from one to thirty inches in width, but will average about twenty-seven hundred feet of four inch. The widest belting ever manufactured in Philadelphia was made at this establishment. It was thirty inches wide and double. The Eagle works produce one fifth of the Philadelphia-made leather belting.

—FOR some reason, within the last few years, lead paints become readily impaired by the action of the atmosphere and sun upon the painted surface, frequently scaling, &c. The cause of this manufacturers are not able to account for, though many explanations are offered. The Pecora Paint Company present what is claimed as the discovery of a durable paint—(the title *pecora* adopted, is Spanish for enduring, everlasting). This manufacture of paint is a combination of iron and other pigments in definite proportions. Houses painted with it retain their hue and solidity for years, and we are informed that work done with it from seven to nine years ago shows the paint in excellent preservation.

—WE had occasion to notice in a former number the launch of a new iron steamer from a Philadelphia shipyard, and the fact that this was the first vessel built in America having compound engines of pure English type, with all the latest improvements; since then the vessel in question has made a trial-trip, carrying a full cargo from Philadelphia to Charleston, S.C., and proved a complete success. The vessel is of about 1,200 tons burthen, and is intended for a line from New York to Galveston, and when laden to the load line, averaged a speed of ten miles per hour with a consumption of only eight tons of fuel in twenty-four hours. This we understand is fully equal to the best average performance of English built vessels.

—BY allowing a jet of steam to blow through melted slag, a peculiar substance much resembling cotton is produced, caused by the extreme attenuation of the particles of the slag on being rapidly cooled. At a recent meeting of the Franklin Institute, Philadelphia, specimens of this material were exhibited which present a resemblance to asbestos. It has been proposed as a non-conducting casing for boilers, cylinders, and steam pipes, for which it is peculiarly adapted.

—STRIKES for advance of wages in England, Germany, and France, are on the increase. In Germany these strikes have been carried on very persistently since the ending of the war with France, causing a general rise of 25 per cent. in the price of labor in a single year, with a reduction of working hours from twelve to ten. Prices of products have advanced in corresponding ratio. The German agricultural laborers are endeavoring to obtain land proprietorship, and those who fail in this endeavor are emigrating to the United States.

—AT the session of the National photographers convention May 9th, at St. Louis, officers were elected for the ensuing year: A. Bogardus, of New York, president with one vice-president from each State; E. S. Wilson, of Philadelphia secretary, and Albert Moore, of Philadelphia, treasurer.

—NOW comes marbled glass to take its place as a building material along with iron, brown stone, marble, and granite. It closely resembles marble, and can be manufactured in every color and variety, and the color, it is said, will be indestructible.

—THE third convention of the National Association of Iron Manufacturers was in session in Pittsburgh May 9th. The proceedings were private. An adjournment took place till September.

MONETARY.

THE stringency and excitement noted in our former remarks as disturbing the financial situation have given place to quiet and dullness. In the changing flow of currency the western markets begin to feel the pressure which has relaxed in the east, and western shippers will not be able to find any important relief from the seaboard until lake and canal navigation enables them to forward their accumulated stocks. The deadlock in respect to the Washington treaty exercises some depressing influence: American securities are beginning to be returned from Europe, and capitalists are holding off till "indirect damages" get into an intelligibly pacific shape.

A bill appears in the Federal congress whose purpose is to provide a reserve of currency and coin to meet the local exigencies coming from their outflow—a recourse in the period when efflux is at its maximum and influx at its minimum for inordinately taxed borrowers of currency and purchasers of coin. The general plan is to set apart \$30,000,000 of coin and \$25,000,000 of currency, to be loaned by the treasury upon security of United States bonds for not over one year at not less than 8 per cent. per annum, according to regulations and restrictions set forth. The loan of coin and currency serve very different purposes, but the object is to check lock-ups of either. Government interference in commercial matters is not to our taste when it can possibly be avoided, and the general effect of such a law would be to enlarge the area and opportunities of credit, which generally wants more the more it gets.

—Sales of Stocks, etc., at New York.

	April 1.	April 8.	April 15.	April 22.	April 29.
U. S. 6's, coupon, 1881.....	115½	115½	116	116½	117½
" 5-20's, coupon, 1862.....	112½	112½	113½	114	115½
" 5-20's, coupon, 1864.....	112½	112½	113½	114	115½
" 5-20's, coupon, 1865, m & n.....	112½	113	114	114½	116
" 5-20's, coupon, 1865, j & jy.....	111½	111½	112½	113½	114½
" 5-20's, coupon, 1867.....	113	112½	113½	114	115½
" 5-20's, coupon, 1868.....	113	113½	113½	114½	115½
" 10-40's, coupon.....	108	108½	109	109½	110½
Pacific 6's, currency.....	115½	115½	115½	115½	116½
Tennessee 6's.....	66½	67	66½	67½	69½
" 6's, new.....	66½	67	66½	67½	70
North Carolina 6's.....	86	86	86	86	87
" 6's, new.....	21	20	20	20	22
Missouri 6's.....	95	95½	95½	95½	96½
N. Y. Central and Hudson R. con.....	101½	98½	98½	99½	100½
Harlem.....	115½	112	113½	125	129½
Erie.....	66½	63	63½	64½	69½
Lake Shore and Michigan Southern.....	98½	96½	96	96½	97½
Wabash.....	79½	79	78½	78	78½
Cleveland & Pittsburgh.....	93	92	92	....	....
Northwestern.....	84½	82½	80½	81½	80½
" preferred.....	96½	94½	94	94	95
Rock Island.....	118	*112½	112½	112½	116
Fort Wayne.....	97½	96½	95½	97	97½
Milwaukee and St. Paul.....	64½	62	61½	62	62½
" preferred.....	81½	80½	81½	80½	81½
Ohio and Mississippi.....	51½	48½	48½	48½	50½
New Jersey Central.....	110½	109½	109½	111	110½
Western Union Telegraph.....	74½	74	74	76	76½
Pacific Mail.....	64½	64½	63½	69½	74½
Union Pacific.....	41½	38½	38	39½	40½
Adams Express.....	97½	95½	97½	98½	99½

	April 1.	April 8.	April 15.	April 22.	April 29.
Wells, Fargo & Co. Express.....	77½	79½	79½	81	83
American Merchants Union Ex.....	73½	73½	73	73½	74½
United States Express.....	74	71½	73½	73½	73
Rate for Money.....	7@½	7@½	7@½	7	5@

Sales of Stocks, etc., at Philadelphia.

Gold.....	110	110½	110½	111	112
Lehigh Valley Railroad.....	58½	59½	59½	58	59
“ “ allots.....	58½	58½	59½	58	59
“ “ 6's.....	95	95	95	95	95
“ “ 7's, reg.....	100½	102	103	102½	103
Lehigh Navigation.....	45½	47½	47	46	47
“ “ 6's, 1884.....	87½	87	88	89	89
“ “ 6's, g ln.....	92½	93	94	94	94
“ “ 6's, R.....	93	93½	94	94	94
City 6's, no tax.....	101½	101½	101½	101	101
“ tax.....	97	97	97	97	97
Pennsylvania Railroad.....	61½	61½	61½	61½	61½
“ “ allotments.....	58½	58½	58½	58	58
“ “ 6's, 1m.....	99	99	99½	100	100
“ “ 6's, 2m.....	96	97	97	97	97
Pennsylvania 6's, w ln.....	100½	100	100	100	100
“ “ 6's, first ser.....	101	101½	101	101½	101½
“ “ 6's, second ser.....	104	104½	104	104	104
“ “ 6's, third ser.....	107	....	....	107	....
“ “ 5's, cp.....	....	....	....	....	....
Reading Railroad.....	57½	58½	59½	59½	59½
“ “ 6's, mt.....	93½	93	....	93½	....
“ “ 7's.....	....	....	....	....	....
Catawissa Railroad.....	....	14	....	17½	....
“ “ preferred.....	46	47	46½	47	46
New York and Middle.....	....	....	....	....	....
North Pennsylvania R. R.....	50	50	50	50	50
“ “ 6's, mt.....	99½	99½	99½	100	100
“ “ 7's, mt.....	96½	97	98	97½	97
“ “ 10's, chat.....	....	....	....	....	....
Camden and Amboy R. R.....	125½	126	126½	125½	125
“ “ 6's, mt, 1889.....	96	96½	96½	96½	96
“ “ 6's, 1888.....	....	91	91	91½	91
“ “ 6's, 1889.....	91	91	91	91	91
West Jersey Railroad 6's.....	93	93½	93½	93½	93
“ “ 7's.....	103	100½	....	101½	....
Philadelphia and Erie.....	28½	29	28½	28	28
“ “ 6's.....	86½	87	....	88	86
Allegheny County, 5 cp.....	78	....	....	78½	78
Schuylkill Navigation.....	8	8	8	....	....
“ “ preferred.....	16	16	16	15½	16
“ “ 6's, 1882.....	78	78	78	79	78
Morris Canal.....	48	48	....	48	....
“ “ preferred.....	....	124½	124½	124	124
“ “ 6's, 1882.....	....	90	....	90	....
Little Schuylkill Railroad.....	46½	46½	46½	46½	46
Oil Ck. and Al. R.....	88½	40½	41½	41½	41
“ “ 7's.....	82	82	....	83½	82
Phila., Ger., and Nor. R. R.....	87	87½	87½	87½	87
Minehill Railroad.....	53	53	53	53½	53
Elmira and Williamsport, preferred.....	40	....	....	40	....
“ “ 7's.....	....	....	....	....	....
“ “ 5's.....	57	57	56½	57	57
Northern Central.....	88½	39	....	89½	88
Fulton Coal.....	5	....	5	....	....
Big Mountain.....	....	....	....	....	....
Rate for Money.....	6@½	7	6½@7	6½@7½	6

NOTING AND COMMENTING.

The Carlist difficulties in Spain are apparently of much greater moment than was at first supposed. Whether the fiasco of 1839 and that of 1840 had created the impression that the adventures of Don Carlos were without any real length, or the seeming success of King Amadeus had closed our eyes to the possibility of real opposition to the existing government side of the ranks of the republicans, there is mainly something surprising in the force of the present movement, in so far as it can be discerned through the contorting medium of the contradictory and exaggerated dispatches from Madrid. The fact that Serrano has thought it necessary to assume personally the command of Navarre is perhaps the only reliable indication of the strength of the movement. Zorilla, in a great bulk of the extreme radicals, has named the defence of the constitution against rebels, and the result may very likely be an increase of strength to the Sagasta administration. The latest indications are that this is the probable result of the Carlist rising. The rumors of another Franco-Prussian war, which the month has given rise to, are very serious, and not without foundation. The foreign policy of M. Thiers is certainly based on the idea that military strength is the first and strongest element of French greatness; and he is equally certain that he is sacrificing to that very important civil and industrial interests. It is not possible, of course, than any of an immediate war can be entertained; the possible disruption of Austria, and the probable complications in the Eastern question, may at any moment convulse Europe, and in such a contingency France armed would be a very valuable ally to either Russia or England. M. Thiers has quite abandoned, of late, the cloak under which the reorganization of the army is being carried on. The army estimates that two months ago were so moderate, are suddenly taken upon themselves gigantic proportions. The field guns have been increased from 1,800 (numerical strength) to 2,700 (real length); and the army itself, under the bill recently submitted, and the passage of which is no matter of course, is to have for defensive purposes a strength of 1,300,000 men, and for offensive operations 700,000, and M. Thiers has

openly boasted that it has never been as efficient as now.

The Gladstone ministry has been having a hard season since the Easter holidays. After several dangerous divisions, the government declined to accept a vote of confidence a division upon Mr. Fawcett's University bill. A crisis is universally anticipated, and would be, humanly speaking, certain, were it not for the distrust in which Mr. Disraeli is still held by his own party, coupled with the difficulty of finding anyone to take his place. On the 11th of April, John Bright resumed his seat in the house of commons for the first time since his protracted illness. It is announced that he will take no part in public affairs beyond the registration of his vote, but it is hardly possible for the great liberal to remain entirely silent in the present exigencies of the party to whose success he so largely contributed, and which still looks to him for support. A very enthusiastic meeting commemorative of the late earl of Mayo, governor-general of India, was held on the 27th ult., at which the duke of Edinburgh presided, and Mr. Disraeli, the dukes of Cambridge and Richmond, and the earls of Derby and Shaftesbury were present.

The eruption of Mount Vesuvius has been the great event of the month to Italy. Three or four towns, including Bosco and San Sebastiano, had been partially, and the village of Massa di Somma entirely destroyed. The loss of life has been comparatively small, but the loss of property has been very great, and as it has fallen for the most part upon the peasantry and the small land owners, the distress has been so severe as to call for governmental aid and support. Naples itself has been seriously threatened, and its streets are still filled with ashes. Since June, 1631, there has been no eruption of the volcano of equal importance, and the consequences to the crops have been most disastrous.

The strike of the Berlinese workmen, embracing a large number of representatives of all the trades, continues and daily assumes a more serious aspect. The minister of public worship has given formal notice to Bishop Ermeland that as the sentences of excommunication against the German subjects clash with the civil law, and affect unfavorably the social

status, the consent of government must be obtained before such sentences are pronounced. The minister insists on obedience to the laws, and intimates that a failure in that duty on the part of the bishop will lead to a withdrawal by the government of its official recognition of his ecclesiastical functions.

The very important convention of the international congress for the prevention of crime, at which Great Britain, France, Russia, the German empire, Italy, Switzerland, and this country are to be represented, is announced to meet in London on the 3d of the coming July.

—Our country seems to be especially adapted to startle the world by novel scenes of lawlessness and bloodshed. This is an account of an affray in the Indian territory: A desperado named Proctor was on trial for murder—a commonplace affair in his estimation, as he is credited with eighteen murders of greater or less degree. His acquittal was expected, and several United States marshals were sent to arrest him on another charge, in case he was acquitted. The posse approached the court-house and were fired upon by persons inside the building. The fire was returned by the marshals' party and their friends in the court-house, and very speedily the fight became general. Ten persons were killed, and nearly twice that number were wounded—some of them mortally. Some of the killed belonged to the marshals' party. Ever since the Indian territory was organized it has been the refuge of outlaws from the adjacent regions, and hundreds of men who had violated the laws in Arkansas, Texas, Missouri, and Kansas, have found a safe retreat within its boundaries. The five Indian tribes—Choctaws, Cherokees, Seminoles, Creeks, and Chickasaws—have an independent existence, and occupy the anomalous position of nations on the soil, and inside the limits of another nation. They have their own laws and courts, and some of their forms of justice are materially unlike our own. Immunity from punishment has attracted to the Indian territory many outlaws from surrounding States and made life insecure. Many of the most intelligent Indians deprecate the present state of affairs, and desire a territorial government for their country similar to the government of the regular organized territories of the United States. A bill with this object was introduced in congress in the present session, and, judging by the recent tragedy, its immediate passage is demanded.

—The south-eastern part of California was visited on the 26th of March last by an earthquake of a very serious nature. A dispatch from the section visited states that fully 1,000 distinct shocks were felt up to Wednesday morning (the day after the first shock was experienced). Some of the shocks were preceded by a deafening report, as though the mountains were being rent in twain, while others were accompanied by a low, continuous rumble, as of a train of cars running under ground. The

earth opened in many places in large seams running for the most part parallel with each other, and at one point it is reported that a crack in the earth extended a distance of over three miles—one side remaining stationary while the other sank some seven or eight feet leaving a wall of earth, extending over ten miles, where there was formerly a level plain. The theory that has been gaining ground in some time—that earthquakes are not caused by subterranean forces, but rather by atmospheric causes, or electrical power from above the earth, would seem to be sustained, by the phenomena in California; for it was observed that while the surface of the earth was rent and shaken in directions, the workmen in the deep mines were unaware of the convulsion above them.

—Among the laws enacted at the late session of the legislature of Pennsylvania was one to establish a bureau of statistics on the subject of labor and agriculture. It provides that the chief of such bureau shall collect, compile, and systematize statistics, with reference to the subject of labor in its relations to the social, educational, industrial, and general conditions, wages, and treatment of all classes of our working people, and how the same affect the permanent prosperity and productive industry of the commonwealth; also, to collect statistics relating to the mineral, manufacturing, agricultural, and commercial productions of the commonwealth; the chief of bureau to report annually to the legislature in convenient form.

—A BILL is now before the New York senate to incorporate the New York and Canada Bridge Company. This company proposes to construct and maintain a bridge for railroad purposes across the Niagara river, from some point below Squaw Island, on the right bank of the river, crossing any island it may deem expedient, some point in Canada; or to construct a tunnel under the river, connecting the American and Canadian shores at some point below the city of Buffalo.

—To get at the right basis of our great centennial commemoration in 1876, it is suggested that the several State legislatures declare the first two weeks in July, 1876, a legal holiday. Then with an invitation extended by the Federal government to the respective peoples and governments of the world to participate by representation, the proportions of the great event will begin to be so appreciated that the arrangements will begin to assume an adequate scale.

—The following figures represent the length per lineyard of the great tunnels of the world, including the Hoosac tunnel in our own country: Mont Cenis, \$875; Kilsby, Saltwood, and Blotchingly, in England, \$725, \$590, and \$350, respectively; Terre Noire, on the Paris, Lyons, and Mediterranean line, \$150; Batignolles, near Paris, \$175; Hauenstein, between Basel and Berne, Switzerland, \$400; Moorhouse, New Zealand, \$345; Hoosac, 900.

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MR. HELPS'S "THOUGHTS UPON GOVERNMENT."

WE confess to not having liked Mr. Helps's essays once. We looked over them as they were published, because they belonged to the literature of the day, not because they attracted us. There was no warmth in their style to enlist the sympathies, no richness of epithet to please the taste, no elaborately constructed framework of system to gain the fealty of the intellect. They were nothing more than plain talks about matters of everyday life; and, though matters of everyday life often involve deep problems of philosophy, it would be a sad waste of time to attempt the perusal of all that commonplace men have said about them in a commonplace way. Hence, after skimming over Mr. Helps's books, we put them, one after another, up on a shelf devoted to specimens of respectable mediocrity, scarcely expecting to look into them again.

But their influence grew upon us. We sometimes met with detached passages from them, that seemed original and striking. We got to taking them down occasionally and dipping into them for a few minutes, and after awhile we found room for them on a more accessible shelf. Their calm and modest suggestions began to give us a deal of quiet pleasure. This disposition has been increasing in us for some time, and has been strengthened by a perusal of the recently published Thoughts upon Government. Hence we want to say a few words to our readers about this book, about Mr. Helps's manner of treating his subject, about

his most important conclusions, about the way in which he has arrived at them, and especially about the admirable spirit with which they are pervaded.

There is a striking contrast between Mr. Helps and Mr. Spencer, whose *Social Statics* also treats of fundamental questions of government. This contrast goes deeper than any mere peculiarity of style; it extends to the very nature of their mental processes. Mr. Spencer relies on deductive reasoning: Mr. Helps, on informal meditation. Mr. Spencer first settles his general principles, which apply to every possible case, and then proceeds to deduce from them what should be done in this, that, and the other set of circumstances. Mr. Helps, on the contrary, has *thought up* to his widest views. He has observed acts of government in a great many thousand instances; those which produced good results have got more or less classified in his mind; so have those which produced bad results; and thus he has gradually arrived at his opinions as to what kinds of things government should do, and what kinds it should not.

It results from Mr. Spencer's method that the reader is apt to assent to conclusions because they are admirably reasoned out, when he ought rather to give his attention to the premises, and see whether or not they are warranted in all their generality. These premises are of the most abstract form, and sometimes need restriction or qualification. Hence conclusions drawn from them in all their generality may be erroneous, though the deduction is ever so perfect. Now, Mr. Helps seldom attempts to give his readers the grounds of his conclusions. Indeed, it would be impossible for him to do so, as they are based on the experience of his life. He has little formal reasoning. "One's experience," he tells us, "does not always embody itself in the form of reasoning. A doctor cannot always tell you why he has come to certain conclusions about a patient's case. There are subtleties of observation which do not readily take a precise and logical form; but which, nevertheless, are well founded, and are often of extreme significance." Prof. Tyndall has a similar remark: "There is in the human intellect a power of expansion—I might almost call it a power of creation—which is brought into play by the simple brooding upon facts." It is this power which Mr. Helps happily exemplifies. He takes little note of the process of thought; he meditates on things, and his opinions about them arise informally in his mind. Of course this is not always the best way of getting at the truth. It is the way in which all sorts of erroneous opinions are adopted; it is the way in which the great mass of mankind come to believe as they do. That very fact, however, shows that it accords with the conditions of existence, that there is at least stability in it; and perhaps the mistaken

of the ignorant are not so much due to the defectiveness of their method as to the narrowness of their view—so that a man of wide observation and thoughtful disposition will often come to conclusions which he is unable to justify by reason, yet knows to be well founded. It is related that a plain sensible man, but unskilled in law, being appointed a judge in one of the English colonies, was advised by an experienced member of the government to give his decisions boldly, according to what seemed to him right, but to refrain from stating his reasons, as they would most probably be wrong. He followed this advice, the story continues, for a long time, and gained great credit for his sound judgments, till, growing too confident, he attempted to give his reasons for a certain decision, and lost his reputation in a day. Mr. Helps is a practiced writer, and would not probably lose any reputation by marshalling a long array of facts in support of his opinions; yet, as all that he could bring forward are but a small part of those on which those opinions are really based, he is somewhat excusable for not doing so; not altogether, however; for, as Prof. Tyndall happily puts it, "I take it to be well worth the while of the scientific teacher to take some pains, and even great pains, to make those whom he addresses co-partners of his thoughts." In this respect, as in many others, Mr. Spencer is much superior to Mr. Helps, and has done far more towards the establishment of a true social science. Yet Mr. Spencer's intellectual greatness is not to our mind so much evinced by his *Social Statics* as by his later works, especially those of a biological character, and he seems to us to err in virtually assuming that he is not liable to mistake. He speaks as a dictator. Whatever his highly abstract first principles demand, he treats as having passed from the reason of investigation into that of instruction, so that nothing remains but to propagate his doctrines as widely as possible, however repugnant they may be to the prevalent customs and established convictions of mankind. Mr. Helps, on the contrary, is not too tenacious of his own opinions. He sees that, though justified by his limited experience, they may possibly be proved fallacious by a wider one. With an unusual candor and perception of his own fallibility, he remarks:—

"Above all things, I am anxious to take my readers into council with me. I do not suppose that any man (certainly not this writer) can be absolutely right in the views he brings forward. Nothing is more odious to me than dogmatism, in matters which admit of much discussion, and in which vast numbers of people are interested. I would even have my readers remember that I am an official man, and may have all the prejudices belonging to my calling."

Such a disposition leads naturally to a quiet style and plain familiar words, quite a different dialect of the English language from Mr. Spen-

cer's scientific vocabulary. We hear nothing of "statics" and "dynamics," "individuation" and "differentiation," "the homogeneous" and "the heterogeneous;" but we have accurate language nevertheless, and perhaps language as well adapted to the subject treated of as if it were modelled after that used in physical science. To give an idea of its merits, as well as of the praiseworthy spirit of moderation which is the key-note of the book, we will endeavor to epitomize Mr. Helps's treatment of two or three important subjects.

The phrase "paternal government" has been bandied about a good deal of late; and we apprehend that much of the disagreement concerning it is due to the fact that some writers use it to mean one thing, and some to mean another thing. It may refer merely to a paternal interest in the governed; such an anxiety for their welfare as a parent feels for a child. But it may, on the other hand, refer to the weakness of wanting to do everything for the governed; such things as a parent is obliged to do for a comparatively helpless child. We may easily have too much of this—many people think any of it is too much of it. There are many things which people can do and are willing to do for themselves much better than any government can; perhaps the government should be dispensed with in all cases where it is dispensable. And as to some things which the government can do better, it is desirable that the citizens should have the education to be gained even by doing them imperfectly, and should acquire the habit of relying on themselves. If they neglect any important matter altogether, however, the government *must* step in. Yet even there its course should, if possible, be such as to awaken in its citizens an interest in the work and a growing willingness to assume it themselves.

But it must not be forgotten that as civilization advances there is more and more detail in government, because of increasing complexity in the conditions of life. Individual power becomes less and less in relation to society—the distinctive unit is measurably lost in the aggregation. Take lighting as an instance. When every householder controlled the lighting of his own house, there was no occasion for any interference of government. But, with the introduction of gas, no private person using the public or general illuminator, has power enough to insure that the quality or price of his light shall be what it ought to be, and effective competition being out of the question, government alone can afford the proper protection to its citizens. A similar course of argument applies to drainage, sewage, water supply, and in some cases to railways and telegraphs. Mr. Helps gives the following instance from his own observation:—

"I knew a person who, in the innocence and confidence of youth,

somewhat presumptuously, took upon himself the endeavor to abate a great public nuisance, namely—an open ditch, which had originally been nothing more than a well-meaning outlet for draining some fields, but which in the progress of building, had become a sewer of intense malignity. This enterprising young reformer soon found that nothing less than the power of the State could abate this nuisance. One person was willing, but not able to do any good in the matter; another was able, but not willing; a third had only a life, or lease-hold interest, and had, therefore, no hearty care for improvement. Occasionally, the property, through which this foul sewer ran, belonged to some corporation which was a most difficult body to move. In some instances the owner of the property was not to be discovered, or when discovered was found to be incompetent to manage his own affairs. In other cases the ownership was the subject of legal controversy. Altogether, it was soon manifest that nothing could be done in the matter without State interference.”

Accordingly we find the best modern governments taking in hand a host of things which ancient ones had little or nothing to do with. Some of the most prominent of these are education (including the establishment of public libraries), the employment of children in mines and factories, postal and telegraphic arrangements, railways, the surveying and lighting of coasts, the creation and regulation of corporations, the public health, and the sanitary arrangements of emigrant ships. On the other hand, they have relinquished or diminished their action with respect to sumptuary laws, establishments of religion, and some kindred matters, concerning which public opinion has undergone a decided change.

With regard to centralization versus localization, Mr. Helps exhibits the same moderation of view as he does with regard to the general sphere of government. He is deeply impressed with the advantages of local action. He sees the use to be made of special local knowledge which can hardly ever be mastered by a central authority. He also sees a fact of much more importance, namely, that the activity and efficiency of local authorities (not mere delegates from the central power, as the French prefects are, but authorities really organized among the local population) form a good measure of the freedom and independence of the individuals composing a State. It is by local action that most men can learn and practice the art of governing. Local government is the nearest to self-government. It is by local action that men of different classes become most interested in one another's well-being, and learn one another's worth. It is also by local action that most men can become good judges of the proceedings of the general government, and exercise intelligently whatever control they possess over it. They learn to appreciate some of the difficulties of government in general. They

find how hard a thing it is to make men of one mind, and to get business carried forward when there is great freedom of discussion and action. They also learn something of the value of good agents, and the importance of adopting such a system of appointments as will tend to secure them.

It is, of course, impossible to form an exact list of the subjects which should be entrusted to local governments. The peculiar circumstances of each case should decide. In sanitary matters, for example, in which local government is undoubtedly desirable, it must also be taken into account that the highest intellect and the greatest experience gravitate to metropolitan centres, and a mass of ability accumulates there which is invaluable even for the conduct of minute affairs. Mr. Helps tells us that he has over and over again observed that some important cause of ill health has long remained in a locality, unsuspected by those who were specially interested in it, when an expert sent down to the neighborhood by central authority has discovered it at once. Considering local authority as delegated from a higher body, inspection of its subordinate governments becomes one of the highest duties of the general government; and when it finds serious local evils, it should take action to suppress them. It is highly desirable that it should be on such terms with the local authority that its advice would be willingly accepted; but, if this is not the case, it must sometimes put forth its power. In every instance a separate judgment must be formed upon the special merits of the case. There is no brief set of rules which can be relied on to tell when there should be interference and when not. The best guiding principles are the habits formed of taking such action as has been formerly seen to produce good results. It is important, however, for the central authority to remember that it may overrate its own efficiency, and take so much upon itself that sufficient time and energy will be wanting to properly carry out its intentions.

Mr. Helps lays great stress on the importance of attracting able men to the service of government. And indeed this is a desideratum on which too great stress can scarcely be laid. There is absolute, imperative, growing need for good, qualified men. The best systems and laws cannot be worked without them; in fact, the more refined and powerful the machinery, the more intelligent must be the men to guide it. "I have two hundred millions in my coffers," exclaimed Napoleon at a critical moment, "and I would give them all for Ney." The self-styled scientific school in history tells us that the course of events is determined by all preëxisting circumstances, and that the men who are most prominent in its development are necessarily creatures of those circumstances. We may accept this statement fully without abating one particle of our

respect for those great men who themselves form elements of important events, without which the events would be of a widely different character.

On this point, Mr. Helps is naturally led to give his opinions on the system of competitive examinations as a means of discerning men's qualifications for office. He holds that it is inadequate and misdirected. The main reasons given for its adoption are that it prevents jobbery, relieves men in power from importunity, and encourages education. These are very good objects, but unfortunately they are foreign to the main object, which is to choose fit men for certain employments. There is certainly much truth and pith in the following remarks:—

“You wish to ascertain that a man will be zealous, faithful, true, reticent, cautious, and capable of dealing rapidly with current business; and also, as he advances in office, of taking a certain amount of responsibility upon himself. You think that you have accomplished this end by ascertaining that he can construe Latin, and has been crammed with a certain knowledge of the facts of history, which facts, having been devoured rather than digested, stand very little chance of being well used by him for the future, and will probably be entirely forgotten.”

“As a humorous person, I know, is wont to say, ‘If you were to try the candidates in whist, there might be a chance of discerning whether they would be capable of dealing with the real business of the world.’”

“Young people very often manifest a readiness to acquire knowledge merely from a certain docility of mind, which makes few enquiries, is easily satisfied with what the teacher tells it, and never cares to take an original and independent view of what is taught. These qualifications are exactly opposed to those which are wanted in the conduct of business.”

Mr. Helps is, however, particular to state that he does consider some examination desirable for candidates for office; only it need not be competitive. There are certain primary requisites, the existence of which should be tested by examination; for example, reading, writing, arithmetic, and, he would add, the digesting of documents and the making of abstracts from them. As this is an exciting subject now in the United States, it may be well to remark that while we fully accept his views, they do not settle the question for us. No doubt the best mode of making appointments is to have the appointing power placed in the hands of perfectly honorable, wise, and experienced men, and to leave them untrammelled by any limitations of their choice. Such tests and indications as they would trust to for finding out the men best suited to the work to be done, would probably secure an unrivalled civil service. But the choice for us is not between competitive examinations and this.

It is perhaps between competitive examinations and a system of party pressure, insecurity of tenure, and individual jobbery, which is almost sure to produce incompetent, inefficient, and dishonest public servants. If such is the case, we should not hesitate to adopt competitive examinations, and endeavor to make them of such a character as to test, as well as it is in their nature to do, the qualities really needed in the post to be filled.

We have no doubt that Mr. Helps would approve of such a practical view of things, for no man is more fully impressed with the belief that gradual and cautious improvement, rather than radical reform, is the proper way to change government for the better. There are numerous limited evils which are continually overlooked by statesmen, because their time is occupied in some grand scheme for altering the framework of society. Humble undertakings, however useful, bring little fame. One does not easily content himself with making the most or the best of some other man's previous work. He rather delights in beginning a new scheme. Take the case of the unhealthy dwellings and filthy neighborhoods occupied by some of the poorer part of the population of large cities. Statesmen have almost entirely neglected such evils, or at most have framed hastily-devised laws concerning them, which are but half carried out for lack of adequate machinery. Socialists, on the other hand, have attacked them in a wildly radical spirit, several of their schemes—to say nothing of their impracticability in other respects—requiring a total demolition of most of the dwelling-houses which are at present upon the earth. Now the humble improver does not wish to demolish the work of ages, but merely to discover possible changes, no matter how trifling, which can be easily effected, and which will make life more comely. He is practically impressed with the fact that the evolution of good government, like the evolution of all other things, though at times admitting of sudden changes, must be in the main effected by minute steps, only great in their ultimate aggregation.

In conclusion, we may say of Mr. Helps's books, there is really much good in them; and if any man does not find it out on a first perusal, we recommend a second and a third. If he does not find it then, we fear the fault is in himself.

DANGER FROM LIGHTNING.

WHEN we hear, says Chambers's Journal, that so many persons are struck by lightning in the course of a year, we are apt to regard the danger from lightning as greater than it really is; and thus the feelings

of awe and terror which many experience during the progress of a thunderstorm are too often increased. In reality, the danger to which we are exposed during such storms is far from great, more especially in towns. It is well that this should be known, because the effects produced on persons of nervous temperament by the vivid flashes of lightning and the resounding peals of thunder, are sufficiently painful, without that additional and even more distressing terror which the apprehension of real danger commonly produces. Instances have been known of death being occasioned by the dread which a thunderstorm has excited, when the seat of danger was in reality several miles away.

There are, however, persons, not otherwise wanting in courage, who experience an oppressive sense of terror—apart from the fear of danger—when electrical phenomena are in progress. The Emperor Augustus used to suffer the most distressing emotions when a thunderstorm was in progress; and he was in the habit of retiring to a low vaulted chamber underground, under the mistaken notion that lightning never penetrates far below the earth's surface. Maj. Vokes, the Irish police-officer—a man whose daring was proverbial—used to be prostrated by terror during a thunderstorm. We cannot doubt that, in these instances, nervous effects are produced which are wholly distinct from the fear engendered by the simple consciousness of danger.

We have said that the danger is small when a thunderstorm is in progress. If we consider the number of persons exposed during a year, in England, to the effects of lightning-storms raging in their immediate neighborhood, and compare with that number the small number of recorded deaths, we shall see that the *probability* of being struck by lightning is very small indeed. The danger we are exposed to in travelling along the most carefully regulated railway, is many times greater than that to which, under ordinary circumstances, we are exposed when a thunderstorm is raging around us. Yet, in cases of this sort, men do not reason according to the doctrine of chances—nor, indeed, is it desirable that they should. There are measures of precaution which, small though the danger may be, it is well to adopt. In a railway carriage, it would be foolish to let the mind dwell upon the danger to which we are in reality exposed, since we can do nothing towards diminishing it. But it would be as unreasonable to neglect precautions in the presence of a heavy thunderstorm, merely because the danger of being struck is small, as it would be to neglect the rules which regulate powder-stores merely because the instances in which fires have been caused by carrying cigar-lights in the coat-pocket, or by wearing iron on the sole of the boot, are few and far between.

We have mentioned one precautionary measure adopted by the

ancients. The notion that lightning does not penetrate the earth to any considerable depth, was in ancient times a wide-spread one. It is still prevalent in China and Japan. The emperors of Japan, according to Kæmpfer, retire during thunderstorms into a grotto, over which a cistern of water has been placed. The water may be designed to extinguish fire produced by the lightning; but more probably it is intended as an additional protection from electrical effects. Water is so excellent a conductor of electricity, that, under certain circumstances, a sheet of water affords almost complete protection to whatever may be below; but this does not prevent fish from being killed by lightning, as Arago has pointed out. In the year 1670, lightning fell on the lake of Zirknitz and killed all the fish in it, so that the inhabitants of the neighborhood were enabled to fill twenty-eight carts with the dead fish found floating on the surface of the lake. That mere depth is no protection, is well shewn by the fact of those singular vitreous tubes called fulgurites, which are known to be caused by the action of lightning, often penetrate the ground to a depth of thirty or forty feet. And instances have been known in which lightning has ascended from the ground to the storm-cloud, instead of following the reverse course. From what depth these ascending lightnings spring, it is impossible to say.

Still, we can scarcely doubt that a place underground, or near the ground, is somewhat safer than a place several stories above the ground floor.

Another remarkable opinion of the ancients was the belief that the skins of seals or of snakes afford protection against lightning. The Emperor Augustus, before mentioned, used to wear seal-skin dresses, under the impression that he derived safety from them. Seal-skin tents were also used by the Romans as a refuge for timid persons during severe thunderstorms. In the Cevennes, Arago tells us the shepherds are still in the habit of collecting the cast-off skins of snakes. They twist them round their hats, under the belief that they thereby secure themselves against the effects of lightning.

Whether there is any real ground for this belief in the protecting effects due to seal-skins and snake-skins, is not known; but there can be no doubt that the material and color of clothing are not without their importance. When the church of Châteauneuf-les-Moutiers was struck by lightning during divine service, two of the officiating priests were severely injured, while a third escaped—who alone wore vestments ornamented with silk. In the same explosion, nine persons were killed, and upwards of eighty injured. But it is noteworthy that several dogs were present in the church, *all of which were killed*. It has also been observed that dark-colored animals are more liable to be struck (other

circumstances being the same) than the light-colored. Nay, more; dappled and piebald animals have been struck; and it has been noticed, that after the stroke, the hair on the lighter parts has come off at the slightest touch, while the hair on the darker parts has not been affected at all. It seems probable, therefore, that silk and felt clothing, and thick black cloth, afford a sort of protection, though not a very trustworthy one, to those who wear them.

The notion has long been prevalent that metallic articles should not be worn during a thunderstorm. There can be no doubt that large metallic masses, on or near the person, attract danger. Arago cites a very noteworthy instance of this. On the 21st of July, 1819, while a thunderstorm was in progress, there were assembled twenty prisoners in the great hall of Biberach jail. Amongst them stood their chief, who had been condemned to death, and was chained by the waist. A heavy stroke of lightning fell on the prison, and the chief was killed, while his companions escaped.

It is not quite so clear that small metallic articles are sources of danger. The fact that, when persons have been struck, the metallic portions of their attire have been in every case affected by the lightning, affords only a presumption on this point, since it does not follow that these metallic articles have actually attracted the lightning-stroke. Instances in which a metallic object has been struck, while the wearer has escaped, are more to the point, though some will be apt to recognize here a protecting agency rather than the reverse. It is related by Kundmann that a stroke of lightning once struck and *fused* a brass bodkin worn by a young girl to fasten her hair, and that she was not even burned. A lady (Arago tells us) had a bracelet fused from her wrist without suffering any injury. And we frequently see in the newspapers accounts of similar escapes. If it is conceded that in these instances the metal has attracted the lightning, it will, of course, be abundantly clear that it is preferable to remove from the person all metallic objects, such as watches, chains, bracelets, and rings, when a thunderstorm is in progress. If, on the other hand, it is thought that the lightning, which would in any case have fallen towards a person, has been attracted by the metal he has worn, so as to leave him uninjured, the contrary view must be adopted. Mr. Brydone considers that a thin chain attached in the manner of a conductor to some metallic article of attire, would serve in this way as an efficient protection. Our own opinion is, that, in general, metallic articles belonging to the attire are not likely to have any noteworthy influence, but that such influence as they do exert is unfavorable to safety. We may agree with Arago, however, that "it is hardly worth while to regard the amount of increased danger occasioned by a watch,

a buckle, a chain, pieces of money, wires, pins, or other peices of metal employed in men's or women's apparel."

Franklin recommends persons who are in houses not protected by lightning-conductors, to avoid the neighborhood of the fire-place; for the soot within the chimney forms a good conductor of electricity, and lightning has frequently been known to enter a house by the chimney. He also recommends that we should avoid metals, gildings, and mirrors. The safest place, he tells us, is in the middle of a room, unless a chandelier be suspended there.

His next rule is not a very useful one. He recommends that we should avoid contact with the walls or the floor, and points out how this is to be done. We may place ourselves in a hammock suspended by silken cords; or, in the not unlikely absence of such a hammock, we should place ourselves on glass or pitch. Failing these, we may adopt the plan of placing ourselves on several mattresses heaped up in the centre of the room. We do not think that such precautions as these are likely to be commonly adopted during a thunderstorm, nor does it seem necessary or desirable that they should be. We have not even the assurance that they greatly diminish the danger. A stroke of lightning which fell on the barracks of St. Maurice, at Lille, in 1838, pierced the mattresses of two beds through and through.

That glass is a protection from lightning is an opinion which has been, and perhaps still is, very prevalent; yet there have been many instances tending to prove the contrary. In September, 1780, Mr. Adair was struck to the ground by lightning, which killed two servants who were standing near him. The glass of the window had not only offered no effective resistance to the lightning, but had been completely pulverized by it, the framework of the window remaining uninjured. Again, in September, 1772, lightning pierced through a pane of glass in a window on the ground floor of a house in Padua, "making a hole as round as if drilled with an auger."

It seems to have been established that if a thunderstorm is in progress, a building is in more danger of being struck when many persons are crowded within it, than when few are present. This points to the danger of the course sometimes followed by the inmates of a house during a thunderstorm. They appear to think that there is safety in society, and crowd into one or two rooms, that they may try, by conversation and mutual encouragement, to shake off the feeling of danger which oppresses them. They are in reality adding, and that sensibly, to any danger there may be. "There is," says Arago, "a source of danger where large assemblages of men or animals are present, in the ascending currents of vapor caused by their perspiration." Like water,

moist air is a good conductor of electricity, and lightning is attracted in the same way—though not, of course, to the same extent, by an ascending column of vapor, as by a regular lightning-conductor. It is on this account, probably, that flocks of sheep are so frequently struck, and so many of them killed by a single stroke. Barns containing grain which has been housed before it is quite dry are more commonly struck by lightning than other buildings, the ascending column of moist air being probably the attracting cause in this case, as in the former. When we are overtaken by a thunderstorm in the open air, precaution is more necessary than within a house. It is well to know, especially when no shelter is near, what is the most prudent course to adopt.

It has been stated that there is danger in running against the wind during a thunderstorm, and that it is better to walk with than against the wind. One should even, it is said, if the wind is very high, run with the wind. The *rationale* of these rules seems to be this: a current of air is produced when we run against the wind, the air on the side turned *from* the wind being rarer than the surrounding air. A man so running "leaves a space behind him in which the air is, comparatively speaking, rarefied!" Lightning would be more likely to seek such a space for its track than a region in which the air is more dense. An instance is recorded in which, during a gale, lightning actually left a conductor which passed from the mast of a ship to her windward side, in order to traverse the space of rarefied air on the ship's larboard side!

It is quite certain that trees are very likely to be struck by lightning, and, therefore, that it is an exceedingly dangerous thing to stand under trees in a storm. No consideration of shelter should induce any one to adopt so dangerous a course. The danger, in fact, is very much greater when heavy rain is falling, since the tree, loaded with moisture, becomes an efficient lightning-conductor. For similar reasons, it is dangerous to seek the shelter of a lofty building (not protected by a lightning-conductor) in a thunderstorm. One of the most terrible catastrophies known in the history of thunderstorms occurred to a crowd of persons who stood in the porch of a village church waiting till a thunder-shower should have passed away.

In the open air, when a heavy thunderstorm is progressing, and no shelter near, the best course is to place one's self at a moderate distance from some tall trees. Franklin considered a distance of about fifteen or twenty feet the best. Henly also considered five or six yards a suitable distance in the case of a single tree. But when the tree is lofty, a somewhat greater distance is preferable.

The reader need hardly be reminded, perhaps, that the necessity for taking these precautions only exists when the storm is really raging close

at hand. When the interval which elapses between the lightning-flash and the thunder-peal is such as to shew that the storm is in reality many miles away, it is altogether unnecessary to take precautions of any sort, however brilliant the flash may be, or however loud the peal. It must be noticed, however, that a storm often travels very rapidly. If the interval of time between the lightning and the thunder is observed to diminish markedly, so that the storm is found to be rapidly approaching the observer's station, the same precautions should at once be taken as though the storm were raging immediately around him. So soon as the interval begins to grow longer, it may be inferred that the storm has passed its point of nearest approach, and is receding. But the laws according to which thunderstorms travel are as yet very little understood; and it is unsafe to assume that because the interval between flash and peal has begun to increase after having diminished, the storm is therefore *certainly* passing away. It must be in the experience of all who have noted the circumstances of thunderstorms, that when a storm is in the neighborhood of the observer, the interval between the flash and the thunder-peal will often increase and diminish alternately several times in succession. It is only when the interval has become considerable, that the danger may be assumed to have passed away.

OVER-LEGISLATION.

THAT the tendency of Anglo-Saxon governments is towards excessive legislation, is one of those truisms to which common experience has given something of the look of an aphorism. We see constantly, on all hands, in the legislatures of both Great Britain and this country, an inclination to control by enactment the most trivial movements of the body politic, or rather to so swathe it in bands that any movement is well nigh impossible. The legislation of the English house of commons in reference to the city of London is said to be so voluminous and so contradictory as to require the study of years for even a superficial understanding of it; and in our own country the annual flood of laws let out upon the community by each recurring legislature is so vast that, long before its effect has been fully realized, its successor is upon us. Much the larger portion of our legislation—probably eighteen-twentieths—is special, that is, applicable only to certain local affairs or particular individuals, and of the remaining two-twentieths, much the greater proportion is unnecessary, and therefore foolish. Of the radically evil legislation

we have nothing to say. It is of that prevailing folly of our legislatures, by which they are led into the assumption of the details and minutiae of public and commercial affairs, the conduct of which should properly be left to certain classes, under the direction of the general laws.

M. Charles de Rémusat has, with admirable fitness, compared a government which attempts to do everything to a schoolmaster who does all the pupils' tasks for them, and who, though for that reason he may be popular with them, is therefore sure to teach them little or nothing. Clever as the epigram of the French publicist is, it leaves out of view the fact that such popularity is never found amongst the pupils who really desire to be taught. So that with a nation like America, such a government fails to win even the poor applause of ignorant idleness. What, exactly, are the functions of government, is a question of too great magnitude, and one upon which the intelligent thought of mankind is too diverse and contradictory to justify the writer in attempting any positive answer. But thus much is agreed upon by all writers upon the science of political government: That one great duty of all governments is the education and development in all directions of their citizens, and the fostering of individual activity and responsibility. As Mr. Mill has expressed it, a government can not have too much of that kind of activity which does not impede, but aids and stimulates individual exertion and development. The mischief begins when, instead of calling forth the activity and powers of individuals and bodies, it substitutes its own activity for theirs. Now it needs no argument to show that the operation of every unnecessary law is similar to the effect of a fetter or some artificial and unnatural compression of the human body. Somewhere it must impede the circulation, and in some degree destroy the equipoise of the system. Some individual, or set of individuals, finds a sudden compression upon his or their life or business, its direction dominated over by some superior power, and the individual activity necessarily diminished.

It must not be forgotten that no law has any justification, save only necessity. The framework of society, resting as it does upon the abandonment by the individual of certain natural rights, in order to secure general protection and development, it follows that any restriction of those rights not tending to secure such protection and development is unauthorized, and in violation of the original compact. The people of a republic, acting through its majority, have no greater authority to impose artificial restrictions upon the minority, than has a constitutional monarchy. All governing bodies are limited in this aspect by the very nature of things within the same bounds. And no law can be otherwise than injurious in effect, as well as unauthorized and indefensible in

theory, that cannot appeal to an influence for the protection and development of the individual in its support.

In estimating the degree of wrong done to a community by over, or in other words, unnecessary legislation, it must be borne in mind that the mischief does not stop with those laws by which commerce is directly injured, or the individual suffers an arbitrary limitation of his natural rights. There is a large and increasing number of statutes that, without producing these results still have a tendency towards preventing the individual and local activities of citizenship. As an illustration of this we might mention the now nearly universal practice of keeping local matters in the custody of some general legislative body—usually the legislature itself—instead of remitting it to the people of the locality. The effect of this is twofold, and is equally bad in both respects. In the first place, the more general the body, and the further removed from the locality, the less intelligent is its action; and the general legislature is, of course, the worst possible custodian of the power. In the next place, by being deprived of the right, and relieved of the obligation of attending to their local affairs, the citizens of the locality have taken from them that healthful stimulus to the activity and intelligent participation in the governing of the country, or their part of it, that it is the duty of the legislature to promote. In the same way the general gathering into the one hand of the conduct of the various local industrial activities, has come to be a thing of everyday occurrence.

The restraints put upon private business of every description, is another illustration of the prevalent excessive legislation. Thus the tax levied upon banking corporations throughout most of the United States, is a most unwise and improvident measure, since the great need of the country is enlarged banking facilities, and the government is bound to assist and not discourage the investment of capital for banking purposes. Then again, not content with the imposition of heavy taxes, it is usual for our legislatures to require incorporated banks to furnish one of the general State officers with an annual statement of their assets, liabilities, line of discounts, etc. One of the results of this is to force those who are desirous of entering the business, to do so as private partners, and as but few are willing to assume that risk, to confine banking privileges within the narrowest limits. Instances of this sort might be multiplied indefinitely and *ad nauseum*. What is needed is a secure, realizing sense that after the necessities of revenue, &c., have been provided for, the operations of business should be left to form their own law, as they will certainly do. The excuse commonly urged for requiring banks to show annually their financial condition to the government, is that the State may in that manner ascertain whether its credit has or has not a sound

foundation, and thus protect its citizens. But if the principle be a sound one, it should be applied as well to a commission merchant or a stock broker. The truth is that no legislative interference with the laws of credit can do aught but harm. And whilst on the one hand it arrests the growth of the business to which it is applied, it fails on the other to secure the end sought: for the ascertainment of credit must be left to the ordinary channels of commerce, and no governmental inspection has ever assisted, or ever can assist in the process.

As might be expected from the multiplicity of laws, their preparation is hurried and in a high degree careless. Perhaps if we could secure any real examination of the measures submitted to our legislature, we would at once put a stop to excessive legislation; at all events the number of laws would be astonishingly reduced.

In the ordinary sessions of American legislatures there is not afforded sufficient time for more than a cursory examination of a tenth of the bills passed. Under our system the only work that is professedly done, is by the committee to which, upon its introduction, a bill is referred. That committee talks about it in a careless, desultory way—perhaps so far exerts itself as to send for some one who knows something of its probable effect, and then recommends it or otherwise, as may more easily accord with the crude notions they have picked up. The only point in reference to it really examined, is its political bearing. Should it be without any partizan effect, the report of the committee is almost invariably decisive. The legislature, knowing absolutely nothing of its contents, passes it or rejects it as a matter of course, and the executive, who has even less interest in it, follows the indorsement of his own political party. Should, however, the bill be found capable of bearing a political meaning, it is at once made the subject of party contention. Reports favorable and adverse are returned from the committee, and the fate of the bill depends upon the strength of the party presenting it. Then, indeed—when the bill is ascertained to be political—are our legislatures astute and untiring in their examination. No outlay of time and trouble is then too great. Whole weeks, and even months, will be cheerfully given up to a bill providing for the erection of a school-house, or the confirmation of some insignificant appointment. Whilst at the close of the session, perhaps within a single week, there will be passed hundreds of bills, many of which have never even been read in the chamber, and of all of which the legislature is really, and in the true sense, wholly ignorant.

We have avoided all reference to corrupt legislatures, and are speaking now only of that carelessness in legislating upon the industrial and commercial interests of the community, and that want of appreciation

of the far-going consequences of their acts, which, joined to an uneasy sense that their duty requires them to do everything for everybody, make our legislatures the objects of so much and such honest dread and dislike.

We cannot ask the highest grade of work from our legislatures, and a certain degree of incompetency is apparently the result of their constitution, and, it may be, necessarily so. But we can rightfully ask that they do what they have to do up to the measure of their capacity, that they shall at least make an honest effort to understand something of the scope and effect of the measures they pass, and that, if they cannot understand them, they will call in competent persons to make the necessary explanations.

One of the consequences of this hasty and unintelligent exercise of legislative authority, and the desire to apply it to the details of business and political life, is the instability of our laws. The hastily-considered law is found to work badly, and is instantly repealed, and its successor takes the field, probably to suffer the same fate, until at last there is a long line of repealed and repealing statutes to which each legislature contributes its own. There are frequent instances of statutes repealed before they had had time to get upon the statute book, and every lawyer can point out statutes, the construction of which, by reason of their inartificial language and obscurity, had cost the community millions, and which, without the slightest reason, were swept away to make room for others more ambiguous or obscure than they had been before the courts had judicially ascertained their meaning. England errs perhaps upon the other extreme, suffering as she does, thousands of laws whose effect has little by little been limited and worn away, until they are in reality obsolete, to remain upon her statute books rather than openly repeal them. But the consequence, whilst confusing to the student, is largely to the benefit of the people, since the element of permanency in all laws is recognized and relied upon. As for the estimate of the injurious effects of unstable, vacillating legislation, it is difficult to make a full statement. There is nothing so unsettling to business as the consciousness that the rules by which it is to-day regulated, may to-morrow be abrogated and succeeded by entirely different ones. The annual changes in our tariff laws are probably nearly as injurious as a tariff law of the worst description could be to the commercial interests of the country. Nor is the evil confined to the uncertainty of our laws as to importations and duties. The old poetical figure, that a pebble thrown into the sea, or the sound of a voice in the air, causes an endless succession of influences that, even when invisible or unheard, continue their unseen force through the immeasurable space, has a not altogether incomplete par-

allel in the effect of every law, and the nature and condition of its change, going out as they do, through every channel of industry, and touching every form of human effort and life. No man can put bounds to the evil of unwise legislative interference with trade and the circumstances of individual life, or the consequences of unstable and continually changing laws. Thus far the illimitable extent of our territorial strength, the magnitude of our mineral resources, the as yet scarcely opened possibilities of our commercial and manufacturing interests, have enabled us to exist—and exist successfully—in spite of over-legislation and foolish laws. But no nation can hope for a healthful life with the element of unwise legislation incorporated in it. And these burdens, that in our youth seem light and of small present importance, will surely and of a certainty cripple our manhood and disgrace our age. The insidious advance of the *habit* of excessive and careless legislation, is to be denounced as one of the worst present evils, and a serious danger of the republic.

THE GENESIS OF GREAT MEN.

OF the classes of persons unprepared, writes Herbert Spencer, to interpret sociological phenomena scientifically, is the class which sees in the course of civilization little else than a record of remarkable persons and their doings. One who is conspicuous as the exponent of this view says: "As I take it, universal history, the history of what man has accomplished in this world, is at bottom the history of the great men who have worked here." And this, not perhaps distinctly formulated, but everywhere implied, is the belief in which nearly all men are brought up. Let us glance at the genesis of it.

Round their camp-fire assembled savages tell the events of the day's chase; and he among them who has done some feat of skill or agility is duly lauded. On a return from the war-path, the sagacity of the chief, and the strength or courage of this or that warrior, are the all-absorbing themes. When the day, or the immediate past, affords no remarkable deed, the topic is the achievement of some noted leader lately dead, or some traditional founder of the tribe—accompanied, it may be, with a dance dramatically representing those victories which the chant recites. Such narratives, concerning as they do the prosperity, and indeed the very existence of the tribe, are of the intensest interest; and in them we have the common root of music, of the drama, of poetry, of biography, of history, and of literature in general. Savage life furnishes little else worthy of note; and the chronicles of tribes contain

scarcely anything more to be remembered. Early historic races show us the same thing. The Egyptian frescoes and the wall-sculptures of the Assyrians represent the deeds of their chief men; and inscriptions such as that on the Moabite stone tell of nothing more than royal achievements: only by implication do these records, pictorial, hieroglyphic, or written, convey anything else. And similarly from the Greek epic: though we gather incidentally that there were towns, and war-vessels, and war-chariots, and sailors, and soldiers to be led and slain, yet the direct intention is to set forth the triumphs of Achilles, the prowess of Ajax, the wisdom of Ulysses, and the like. The lessons given to every civilized child tacitly imply, like the traditions of the uncivilized and semi-civilized, that throughout the past of the human race the doings of the leading persons have been the only things worthy to be chronicled. How Abraham girded up his loins and gat him to this place or that; how Samuel conveyed divine injunctions which Saul disobeyed; how David recounted his adventures as a shepherd, and was reproached for his misdeeds as a king—these, and personalities akin to these, are the facts about which the juvenile reader of the Bible is interested, and respecting which he is catechised: such indications of Jewish institutions as have unavoidably got into the narrative being regarded neither by him nor by his teacher as of moment. So too, when, with hands behind him, he stands to say his lesson out of Pinnoek, we see that the things set down for him to learn are—when and by whom England was invaded; what rulers opposed the invasions and how they were killed; what Alfred did and what Canute said; who fought at Agincourt and who conquered at Flodden; which king abdicated and which usurped, etc.; and if by some chance it comes out that there were serfs in those days, that barons were local rulers, some vassals of others, that subordination of them to a central rule took place gradually, these are facts treated as relatively unimportant. Nay, the like happens when the boy passes into the hands of his classical master, at home or elsewhere. “Arms and the man” form the end of the story as they form its beginning. After the mythology, which of course is all-essential, come the achievements of rulers and soldiers from Agamemnon down to Caesar: what knowledge is gained of social organization, manners, ideas, morals, being such only as the biographical statements involved. And the value of the knowledge is so ranked that while it would be a disgrace to be wrong about the amours of Zeus, and while ignorance concerning the battle of Marathon would be discreditable, it is excusable to know little or nothing of the social arrangements that preceded Lycurgus or the origin and functions of the Areopagus.

Thus the great-man theory of history finds everywhere a ready pre-

pared conception—is, indeed, but the definite expression of that which is latent in the thoughts of the savage, tacitly asserted in all early traditions, and taught to every child by multitudinous illustrations. The glad acceptance it meets with has sundry more special causes. There is, first, this universal love of personalities, which, active in the aboriginal man, dominates still—a love seen in the child which asks you to tell it a story, meaning, thereby, somebody's adventures; a love gratified in adults by police reports, court news, divorce cases, accounts of accidents, and lists of births, marriages and deaths; a love displayed even by conversations in the streets, where fragments of dialogue, heard in passing, prove that mostly between men, and always between women, the personal pronouns recur every instant. If you want roughly to estimate any one's mental calibre, you cannot do it better than by observing the ratio of generalities to personalities in his talk—how far simple truths about individuals are replaced by truths abstracted from numerous experiences of man and things. And, when you have thus measured many, you find but a scattered few likely to take anything more than a biographical view of human affairs. .

In the second place, this great-man theory commends itself as promising instruction along with gratification. Being already fond of hearing about people's sayings and doings, it is pleasant news that, to understand the course of civilization, you have only to read diligently the lives of conspicuous men. What can be a more acceptable doctrine than that while you are satisfying an instinct not very remotely allied to that of the village gossip—while you are receiving through print, instead of orally, remarkable facts concerning notable persons—you are gaining that knowledge which will make clear to you why things have happened thus or thus in the world, and will prepare you for forming a right opinion on each question coming before you as a citizen?

And then, in the third place, the interpretation of things thus given is so beautifully simple—seems so easy to comprehend. Providing you are content with conceptions that are out of focus, as most people's conceptions are, the solutions it yields appear quite satisfactory. Just as that theory of the solar system, which supposes the planets to have been launched into their orbits by the hand of the Almighty, looks quite feasible so long as you do not insist on knowing exactly what is meant by the hand of the Almighty; and just as the special creation of plants and animals seems a satisfactory hypothesis until you try and picture to yourself definitely the process by which one of them is brought into existence; so the genesis of social phenomena through the agency of great men may be very comfortably believed so long as, resting in general notions, you do not ask for particulars.

But now, if, dissatisfied with vagueness, we demand that our ideas should be brought into focus and exactly defined, we discover the hypothesis to be utterly incoherent. If, not stopping at the explanation of social progress as due to the great man, we go back a step and ask whence comes the great man, we find that the theory breaks down completely. The question has two conceivable answers: his origin is supernatural, or it is natural. Is his origin supernatural? Then he is a deputy-god, and we have theocracy once removed—or, rather, not removed at all; for we must then agree with Mr. Shomberg, that “the determination of Cæsar to invade Britain” was divinely inspired, and that from him, down to “George the III, the Great and the Good” the successive rulers were divinely appointed to carry out successive designs. Is this an unacceptable solution? Then the origin of the great man is natural; and immediately he is thus recognized he must be classed with all other phenomena in the society that gave him birth, as a product of its antecedents. Along with the whole generation of which he forms a minute part—along with its institutions, language, knowledge, manners, and its multitudinous arts and appliances, he is a resultant of an enormous aggregate of causes that have been coöperating for ages. True, if you please to ignore all that common observation, verified by physiology, teaches—if you assume that two European parents may produce a Negro child, or that from woolly-haired prognathious Papuans may come a fair, straight-haired infant of the Caucasian type—you may assume that the advent of the great man can occur anywhere and under any conditions. If, disregarding those accumulated results of experience which current proverbs and the generalizations of psychologists alike express, you suppose that a Newton might be born in a Hottentot family, that a Milton might spring up among the Andamanese, that a Howard or a Clarkson might have Fiji parents, then you may proceed with facility to explain social progress as caused by the actions of the great man. But if all biological science, enforcing all popular belief, convinces you that by no possibility will an Aristotle come from a father and mother with facial angles of fifty degrees, and that out of a tribe of cannibals, whose chorus in preparation for a feast of human flesh is a kind of rhythmical roaring, there is not the remotest chance of a Beethoven arising; then you must admit that the genesis of the great man depends on the long series of complex influences which has produced the race in which he appears, and the social state into which that race has slowly grown. If it be a fact that the great man may modify his nation in its structure and actions, it is also a fact that there must have been those antecedent modifications constituting national progress before he could be evolved. Before he can remake his society, his society must

make him. So that all those changes of which he is the proximate initiator have their chief causes in the generations which gave him birth. If there is to be anything like a real explanation of these changes, it must be sought in that aggregate of conditions out of which both he and they have arisen.

Even were we to grant the absurd supposition that the genesis of the great man does not depend on the antecedents furnished by the society he is born in, there would still be the quite-sufficient facts that he is powerless in the absence of the material and mental accumulations which his society inherits from the past, and that he is powerless in the absence of the coexisting population, character, intelligence, and social arrangements. Given a Shakspeare, and what dramas could he have written without the multitudinous traditions of civilized life—without the various experiences which, descending to him from the past, gave wealth to his thought, and without the language which a hundred generations had developed and enriched by use? Suppose a Watt, with all his inventive power, living in a tribe ignorant of iron, or in a tribe that could get only as much iron as a fire blown by hand-bellows will smelt; or suppose him born among ourselves before lathes existed; what chance would there have been of the steam-engine? Imagine a Laplace unaided by that slowly developed system of mathematics which we trace back to its beginnings among the Egyptians; how far would he have got with the *Mécanique Céleste*? Nay, the like questions may be put and have like answers, even if we limit ourselves to those classes of great men on whose doings hero-worshippers more particularly dwell—the conquering rulers and generals. Xenophon could not have achieved his celebrated feat had his ten thousand been feeble, or cowardly, or insubordinate. Cæsar never would have made his conquests without disciplined troops inheriting their *prestige* and tactics and organization from the Romans who lived before them. And, to take a recent instance, the strategical genius of Moltke would have gained no great campaigns had there not been a nation of some forty millions to supply soldiers, and had not those soldiers been men of strong bodies, sturdy characters, obedient natures, and capable of carrying out orders intelligently.

Were any one to marvel over the potency of a grain of detonating powder, which explodes a cannon, propels the shell, and sinks a vessel hit—were he to enlarge on the transcendent virtues of this detonating powder, not mentioning the ignited charge, the shell, the cannon, and all that enormous aggregate of appliances by which these have severally been produced, detonating powder included, we should not regard his interpretation as very rational. But it would fairly compare in rationality with this interpretation of social phenomena which, dwelling on

the important changes which the great man works, ignores that immense preëxisting supply of latent power which he unlocks, and that immeasurable accumulation of antecedents to which both he and this power are due.

Recognizing what truth there is in the great-man theory of history, we may say that, if limited to early societies, the histories of which are histories of little else than endeavors to destroy or subjugate one another, it approximately expresses the fact in representing the capable leader as all-important; though even here it leaves out of sight too much the number and the quality of his followers. But its immense error lies in the assumption that what was once true is true forever; and that a relation of ruler and ruled which was possible and good at one time is possible and good for all time. Just as fast as this predatory activity of early tribes diminishes, just as fast as larger aggregates are formed by conquest or otherwise, just as fast as war ceases to be the business of the whole male population, so fast do societies begin to develop, to show traces of structures and functions not before possible, to acquire increasing complexity along with increasing size, to give origin to new institutions, new activities, new ideas, sentiments, and habits; all of which unobtrusively make their appearance without the thought of any king or legislator. And if you wish to understand these phenomena of social evolution, you will not do it though you should read yourself blind over the biographies of all the great rulers on record.

INTERDEPENDENCE OF SCIENCE AND ART.

AMONG authors of a certain class, it has become quite a common practice to deplore and inveigh against what they call the utilitarian tendency of modern science. This idea is but a repetition of the views held by some of the ancient philosophers, that to apply the results of purely scientific investigation to the useful arts, or to the ordinary affairs of life, exerts a degrading effect upon the pursuit of knowledge: or as it is more happily expressed by a modern writer, "to study science for its useful applications merely, is to limit its advantages to purely sensual ends." Fortunately for the progress and general diffusion of civilization, these opinions are shared by but a limited proportion of observers who are competent to generalize upon the phenomena of nature, or to enter upon the investigation of those principles which underlie the grand theories which form the basis of all scientific speculation. That there is a common reciprocity between science and its useful appli-

cations; that theory and practice are coördinate; that there is a close and indissoluble interdependence between the more abstract investigations and their realization in the multitudinous pursuits which form the occupations of men, must be conceded upon even a casual observation of the subject. Nor is it strange that this intimate union should exist. So close is the bond by which science and art are linked together, that to sever it would be but to retard, if not destroy, the development of both.

Vain and illusory as were the principles which prompted the early alchemists in their attempts to transmute the base metals into gold, or to discover the *elixir vitæ* which should be a panacea for all diseases, and which should add indefinitely to our lease of life, it cannot be denied that their crude and spasmodic investigations gave birth to the science of chemistry. While the labors of these experimenters were prompted by dictates far remote from those which inspire the genuine lover of science, and while the object of their researches was simply a greed of gain, they made many important discoveries, and planted the germ from which have sprung some of the most valuable theories that are now regarded as impregnable against all sceptical assaults.

And while science was thus slowly emerging from a tangled maze of empiricism and superstition—many of her devotees being firm believers in the principles of astrology and other delusions—the gradual improvement of the industrial arts here and there, opened up new and suggestive topics of thought, or furnished materials necessary to the prosecution of systematic researches. To the manufacture of glass are we indebted for the microscope and telescope, without which chemistry and the science of natural history would present many inscrutable mysteries, impossible of solution; while the ennobling study of astronomy would be shorn of its beauty and grandeur, and the knowledge we now possess of the heavenly bodies would be reduced to an insignificance unworthy of being classed among the sciences. Reciprocating the benefits thus conferred by the arts, science has explored the reactions which follow in this department of industry, and by explaining the theory upon which it is based, laying bare its mysteries, and suggesting improvements whereby its product has been vastly beautified and cheapened, has established a firm and unyielding connection.

The arts have ever been the precursors of science. Metallic ores were mined and smelted in a rude empirical way long before the science of metallurgy was reared; and however crudely it may have been conducted, the practice of the art was followed for centuries before its theory was understood, or before the adoption of those refinements and economical processes which the application of science insured. However primi-

tive may have been the pursuit of agriculture, the necessities of individuals have from the earliest ages caused it to be regarded as the fundamental occupation of men. Guided by habit and traditional experience, the same routine of labor has been followed from remote antiquity, and only within a short time has the toil of the husbandman been lightened by the application of those principles which have proved so beneficent in their effects upon other avocations. To the art of printing—the art preservative of all arts—is science indebted in a ratio far greater than that for which credit has been given. It would be difficult to imagine the status the sciences would now occupy but for the powerful influence in preserving and disseminating knowledge which this important craft has subserved. The mere publication of individual observations and discoveries often conveys hints to students far remote from the source whence the germ may have originated, and leads to extended investigations, which bear fruit like seed dropped in a fertile soil. The compilation and preservation of the records of scientific research, and their dissemination by the press, has done more to stimulate scientific inquiry than all other causes combined, and if no other example could be adduced to prove the interdependence of science and art, this alone would suffice.

That the art of making illuminating gas has been one of the most potent instrumentalities in the progress of modern chemistry, few who are acquainted with the subject will deny. The great importance of this art, and its universal application, have led to a thorough investigation of its principles. The wonderful developments which have been made during the last quarter of a century in the department of organic chemistry—a branch of the science which has been virtually created anew—are much indebted to investigations into the nature of the complex bodies eliminated in the distillation of coal. Among the residual products of this branch of technology, the black and repulsive looking coal tar early became the subject of analytical research. Step by step were the labors of the busy workers in this field rewarded by discoveries of the most important nature. Not only were new products revealed and new industries created, but a spirit of scientific inquiry was stimulated, in response to which numerous contributions to our knowledge of chemical reactions were made, possessing a permanent value of the highest kind. The discovery of the aniline series of colors, their varied hues and the theory of their formation, the tints derived from toluidine, naphthaline, and carbolic acid, and the various reactions which these compounds exhibit when treated with the reagents used in investigating their properties, have thrown a flood of light upon chemical phenomena, and have vastly advanced the scope of philosophic induction.

But in other departments of knowledge we shall find that suggestions resulting in the establishment of new theories and generalizations, had their origin in the ordinary channels of industry, and that from this source have sprung some of the grandest and most elaborate conceptions which have occupied the thoughts of men. Although crude suggestions of the convertibility of heat and motion may be found in the writings of Bacon, Locke, Leibnitz, and other philosophers, yet they assumed no definite shape, and were scarcely recognized as more than meaningless utterances. The material doctrine of heat—the hypothetical existence of “caloric” were still believed in with all the assurance with which the pious zealot clings to the cherished dogmas of his creed. The mechanical operation of boring brass cannon, and the observation of the increased temperature caused by the friction of the boring tool against the metal, aroused reflections in the mind of Count Rumford, which culminated in the grand doctrine of the correlation of forces, the acceptance of which no less an authority than Sir William Armstrong has pronounced to be the most important event of the present century. The application of the theory thus first clearly announced by Rumford, has been adopted as the germ of a new era in scientific research, and has led to the utter overthrow of former erroneous views; in the place of which this doctrine, so clearly worked out by Grove, Joule, Mayer, Helmholtz, Carpenter, and other leading authorities, is recognized as a fundamental truth.

The interdependence of the arts and sciences is undeniably asserted in all countries where a high grade of civilization pertains, or where the busy hum of industry affords occupation to the toiling legions who add to human wealth and comfort by furnishing products essential to the demands of modern life. In those favored regions where mineral wealth most abounds; where the treasures of the earth are made tributary to our wants; where, in geologic ages long gone by, the sun's force has been stored away, only to await the moment when it shall again be let loose in multitudes of forges, furnaces, and the like; where the resources of the animal and vegetable kingdoms are drawn upon to blend their diversified products with other fruits of industry—in such countries the sciences have their abode; the theoretical and practical are linked together in a firm and unyielding compact, and by the very indivisibility of their interests, they prove themselves parts of one unbroken whole. To detach one from the other, would be but to destroy the integrity of both.

That the study of science is fostered by its practical applications, is evident from the fact that wherever the varied forms of manufacturing industry determine the chief occupation of a people, there schools of

science abound, and vast strides are made in the acquisition and dissemination of philosophic truths. Of the great powers of the world, Germany, France, and England are preëminently distinguished for their technical schools, where the sciences are taught in the most thorough manner, and where professors of world-wide reputation impart instruction in every branch of knowledge. These countries are likewise the seats of industrial arts, unequalled in extent, unparalleled in detail, and unapproachable in comprehensiveness. Can it be doubted that these two great interests—diametrically opposed, as some observers might deem them to be—are not held together by a common bond? or that if one should be suddenly annihilated, the other would not decay? The development of the manufacturing resources of our own country is relatively of so recent an origin, that we have not included it in the comparison; but even in this instance the same illustration holds good. The same parallelism may be observed between the extension of industrial enterprises and the growing taste for scientific studies. We have unbounded stores of mineral wealth which have only begun to be utilized; almost every endowment which a bounteous Nature has bestowed upon mankind is contained within our own borders. The wide range of our territory gives us such a diversity of climate that most of the essential products of the soil can be cultivated within our own domain. To avail ourselves of these opulent bequests, to profit by our rare advantages, to seek out and recover these raw materials and to fit them for our uses through the medium of the varied industrial arts, is the grand problem which is before us. That these diversified labors will require thoughtful, studious applications of science in every department into which human knowledge is subdivided, few will have the temerity to contradict. That these applications of scientific principles to the daily avocations of life in their future capabilities, will greatly incite researches which must culminate in a wide and general diffusion of knowledge, admits of easy proof. Evidence may be adduced from the experience of the leading nations of Europe; and what has been done there is but a modicum of what we may in time expect, upon a rational development of our far more abundant and varied resources.

That these expectations for the future are not mere shadowy anticipations, may be argued from the status already occupied by our schools of pure and applied science, and the intimate relation which exists between their prosperity and the general success of the industrial arts, whose alternate seasons of activity and depression, if long continued, exhibit a proclivity to increase or diminish the attendance at scientific schools. This assertion is no mere conjecture, but is borne out by the experience of many of our prominent educational establishments.

The interdependence of science and art is strikingly illustrated in the rapid strides with which the study of geology has advanced within a comparatively recent period. Less than a century ago the wildest theories and the crudest generalizations formed the basis of the then accepted doctrines of geological phenomena. One by one these vague ideas have been pruned away; myths have given place to accepted truths; false assumptions have yielded to demonstrations founded upon thorough explorations of the earth's surface, and to facts which have been gathered by studies and researches made amid the darkness and solitude of almost limitless depths. It is surely not derogatory to the dignity of science to assert that to the miner's pick and drill are we indebted for much of the knowledge we now possess of the earth's interior structure. Not that we mean to intimate that the laborers toiling in mines and quarries have themselves promulgated new facts and theories—and even this disavowal must be qualified as regards such workingmen as Hugh Miller and a few others—but that the search for ores and minerals, and the explorations which have been made to determine their existence, have been among the most efficient agencies in disseminating a correct acquaintance with geognostic principles. Through the medium of governmental geological surveys a vast store of information has been gathered, and these investigations have been almost wholly authorized in the interests of economic geology—that branch of the science which comes strictly within the bounds of its utilitarian application. To this intimate relation between theory and practice—this close interdependence between science and art—we are indebted for some of the most elaborate treatises on the phenomena of mineral veins and the metamorphoses of rock formations; and had it not been for this indissoluble union, the literature of geological science would have been deprived of some of its most valuable works; the exhaustive essays of Cotta, Bischof, and other eminent writers—so indispensable in every scientific library—would never have seen the light.

In common with other departments of knowledge, geographical science has reached its present development chiefly through the efforts of navigators and travellers who pursued their journeys with other promptings than those which inspire the student of abstract science. Commerce has even lead the van in those movements which have resulted in increased knowledge of distant parts of the globe. The ancient Phenicians, and other maritime nations, pushed their discoveries and made their voyages in only such directions as were warranted by pecuniary profit. In later epochs the same utilitarian spirit prompted still more distant voyages. In search of mythical El Dorado were the shores of America first visited, and the new world discovered; and however earnestly Columbus himself may have been prompted by a desire to prove the correctness of the theories he

held, it was only because of the prospect of political and material aggrandizement that he was furnished with means to prosecute his voyage, and to demonstrate the existence of other continents than those hitherto known. Inspired by the same motives, the Spaniards, Dutch, Portuguese, and English conducted their explorations into the various quarters of the globe, and gradually perfected the knowledge we possess of its surface. From the attempts made to discover a north-west passage—none of which were undertaken simply in the interests of geographical science—have we derived our acquaintance with the phenomena of Arctic life, and the grandeur of the desolation which reigns supreme in that inhospitable clime.

But it is useless to multiply examples to show the mutual dependence between science and its useful applications. The story of the steam engine, of the telegraph, and of every other serviceable employment of knowledge, might be recounted to prove the point. And while the fact is undeniable, it should be a matter of congratulation among all that believe in human progress that it is so. The moral and spiritual effects of this union of science and art have ineffaceably stamped their imprint upon the records of history. Human toil has been lightened, domestic comforts have been multiplied and cheapened, and the means of refined and cultivated enjoyment have been placed in the hands of those whose predecessors but a generation ago were entirely ignorant of their benefits. Educational facilities have been increased, the condition of the laboring classes has been much improved, and wholesome reforms have been inaugurated. When the study of sociology becomes to be regarded and cultivated as it should be, it will be found that one of the most potent agencies in the amelioration of all classes of mankind has resulted from this union. The assertion that he is a public benefactor who makes two blades of grass grow where one grew before, is true in its metaphorical as well as in its literal sense; and in no other direction has this principle been more thoroughly exemplified than in the results which have emanated from the interdependence of science and art.

SPECIES AND RACE.

THE unity of the human species is a subject which has occupied the minds of ethnologists for many years, and has called forth many learned essays and other disquisitions, which have ramified into all the branches into which the science of anthropology may be divided. A course of lectures on this subject has been begun at the Imperial asyllum

of Vicennes, by M. De Quatrefages, the first of which we find translated in the Popular Science Monthly. In considering the question, the lecturer begins with the proposition—What is man? and proceeds to discuss it at some length from the standpoint of a naturalist—neither trenching on the domains of theology nor philosophy, in their usually restricted meanings.

The first proposition assumed by M. De Quatrefages, is that man—when we take into account all which exists in him—is not simply an animal. That he is widely distinguished from animals by numerous and important characters of different sorts—chief of which is his intellectual superiority, to which belongs articulate speech, so that each people has its special language; writing, which permits the reproduction of this language; the fine arts, by the aid of which he conveys, and in some sort, materializes the conceptions of his imagination. Further, he is the only living being in whom resides moral sense; and is alone in the belief and recognition of a Supreme Being.

But so far as the body alone is concerned, man is simply an animal, and excepting certain differences of form and disposition he is only the equal of the superior animals which surround him; and if we take, for the sake of comparison, the species which most nearly resembles us in form, anatomy shows that our organs are exactly the same as theirs. The comparison is further borne out by the fact that all organized beings have a limited duration; all are born small and feeble; during part of their existence, all grow and strengthen, then decrease in energy and vitality, and sometimes in size, and finally all die.

From these premises, M. De Quatrefages takes up the subject of species and races, showing the exact difference between these two terms, and fortifying his position by adducing many examples—referring to domestic animals familiar to all. Among species he classifies those animals of a different character, which will either not breed at all if crossed with those of another species, or if they do produce a progeny, it is one which dies out with the first generation. Thus the horse and ass belong to different species. Their progeny, the mule, is well known to be incapable of propagating its kind, and hence the race soon dies out. The different breeds of these animals, however, constitute *races*, and however remotely they may be connected, they preserve a common origin by being capable of indefinite propagation among even diverse members of the same species. So, also, in regard to the hare and rabbit—animals which surely present as much resemblance as the horse and the ass. No attempts to produce a hybrid stock from these different species have been successful, and yet among members of each race, propagation is exceedingly rapid. Vegetables afford examples of the

same kind, and the parallel may be carried on throughout the animal and vegetable kingdoms. Dogs, of whatever varieties of the race, breed indiscriminately, and so with vegetables: but with different *species* the result is barrenness.

In the essay of M. De Quatrefages, the American wild turkey is taken as a type of a species. When domesticated, of course, the progeny of this bird exhibits marked peculiarities, resulting from climate, habit, food, and other circumstances. So, also, with the rabbit, which if left to itself, multiplies with extreme rapidity. These and other examples are used as a prelude to the discussion of the various types of the human race with which the world is peopled. They suffice to prove the difference between *species* and *race*, which by observing the phenomena attendant upon the habits of the lower animals, is a subject not very difficult of comprehension.

In discussing the subject of the unity of man, the science of physiology is appealed to, and the law of cross-breeding is the fundamental point of the views held by the author. By cross-breeding he means the marriage occurring between animals which belong to different species, or to different races, the results of which are as follows: When the union takes place between two animals belonging to different species, in an immense majority of cases, the marriage is sterile; and the law which experience has demonstrated, is that infertility is the result when animals of different *species* unite. But, on the contrary, when individuals of a different *race* unite, a mongrel breed is produced: and sometimes these crossings are even more fertile than the union of animals of the same race. Ethnologists have demonstrated that races thrive by crossing. Dogs, domestic cats, and the various breeds of horses and cattle, prove this fact; and from observations made with regard to these and other animals, mixed breeding promotes fertility.

Starting with these facts as premises, M. De Quatrefages boldly espouses the doctrine of the unity of the human race; and, indeed, from his process of reasoning, which is eminently scientific and systematic, there is no escaping the conclusion. Whether crosses are made between the Caucasian, Negro, Malay, Ethiopian, or American races, they all produce prolific progeny, and under whatever circumstances of climate, their descendants exhibit the same fecundity.

But while announcing these theories, the author admits the fact that other anthropologists do not agree with him. There are polygenesists who believe in the multiplicity of the human race; but the simple fact of all conditions of the race being able to mingle, and to produce progeny capable of a like fertility, is regarded as a strong argument in favor of a single origin of man.

same treatment, in which case a double decomposition ensues, with the formation of sulphuret of iron and phosphate of ammonia. From this circumstance, it is probable that the phosphorus in the Cleveland ore exists as phosphate of lime. But this is a matter of trifling importance, since in whatever form it may occur, calcination cannot remove it, and it necessarily finds its way into the blast furnace.

The analyses of the calcined ore, limestone, and coke, used in the furnace, and those of the slag and pig-metal, showed the following quantities of sulphur and phosphorus:—

	Phosphorus.	Sulphur.
Calcined ironstone contained per cent.....	.523	1.053
Limestone..... " " .....	.011	.059
Coke..... " " .....	.265	1.580
Pig-iron..... " "	1.441	.093
Slag..... " " .....	.098	2.633

The consumption of raw material per 100 of iron was:—

Calcined ironstone.....	340
Limestone.....	60
Coke.....	120

And assuming the slag to be in the ratio of 150 to 100 of pig-iron, we have:—

Phosphorus in 240 calcined ironstone, at .....	.523 = 1.253 per 100 of iron
" " 60 limestone, " .....	.011 = .007 " "
" " 120 coke, " .....	.265 = .318 " "

Total phosphorus entering furnace per 100 of iron..... 1.578

Phosphorus leaving furnace in 100 of pig-iron, at 1.441 per cent. = 1.441	
" " " 150 " slag, " .098 " = .147	1.588

Apparent excess leaving the furnace..... .010

Regarding the behavior of the sulphur in the materials, the following data are given:—

Sulphur in 240 calcined ironstone, at	1.053 = 2.525 per 100 of iron
" " 60 limestone, " .....	.059 = .035 " "
" " 120 coke, "	1.580 = 1.896 " "

Total sulphur entering furnace per 100 of iron..... 4.456

Sulphur leaving furnace in 100 of pig-iron, at .093 per cent. = .093	
" " " 150 " slag, " 2.633 " = 3.950	4.043

Apparent excess leaving the furnace..... .413

Assuming these analyses to be correct, it appears that all the phosphorus entering the furnace is accounted for, and that about one-tenth appears in the slag, while the remainder is combined with the iron.

But with regard to the sulphur a wholly different aspect is presented; and the singular anomaly is observed, that the calcined ore contains more of this impurity than the ore in its raw condition, as may be seen by comparing the analyses of the two. This would seem to prove that the lime and magnesia retained the sulphur which might have been combined with the iron—if, indeed, it existed in this form—and further, that the ore likewise absorbed sulphur from the fuel used in the process of calcination. The large difference between the quantity of sulphur entering the furnace, and that leaving it in the slag and pig-metal, is naturally accounted for by the volatility of some of the sulphur compounds. The pungent sulphurous vapors emitted by the slag during its passage from the furnace is evidence of this fact.

These investigations of Mr. Bell settle one or two very important questions—at least with regard to ores similar in composition to those of the Cleveland district. They show that while ninety per cent. of the phosphorus present in the charges which enter the furnace remains combined with the iron, but a trifling proportion of the sulphur is found in the metal; and that while the slag carries off nearly all the latter impurity, it practically performs no such office with regard to the phosphorus.

But even in the case of the sulphur the presence of other substances exert modifying influences which may materially change the reaction. Mr. Bell states that if silica exist in such quantity as to form a perfectly vitreous slag with the alumina and lime, the sulphur is more or less expelled from the lime, and then passes into the iron; while, when lime is in excess, and a basic slag is formed, there is a strong disposition for the sulphur to be retained by the lime, probably as sulphuret of calcium. In the Cleveland ores silica is not abundant, while alumina exists in considerable quantity; so that the slags may be regarded as silico-aluminates of lime, alumina, and magnesia—a fact which permits the use of lime to such an extent that, when added to the lime already existing in the ore, it produces a slag containing forty per cent. and upwards of this substance.

Another important observation is made by Mr. Bell, which is to the effect that, as a general rule, “the lower the temperature at which the furnace is working, the richer is the iron in sulphur; and hence it will be generally found that white iron which is produced with least coke, or during an accidental derangement which depresses the heat of the hearth, contains more sulphur than gray iron, while no such difference attends the quantity of phosphorus present.” The inference drawn from the facts enumerated by Mr. Bell is that there is but little hope of being able to avoid nearly all the phosphorus accumulating in the pig-iron, but by the liberal use of lime, and by the maintenance of a pretty high temperature in the furnace, nearly all the sulphur may be carried off in the slag.

In the narrative of analytical methods which Mr. Bell used in his investigation, one circumstance surprises us, which is the assertion that the molybdic acid process for the estimation of phosphoric acid proved unsatisfactory. In our own practice we have found this method to be by far the most exact and reliable of all the known plans of effecting the preliminary separation of phosphoric acid from its combinations—indispensable, indeed, in all researches where great accuracy is desirable.

—In consideration of the enormous waste of fuel which attends the operation of furnaces of all descriptions, the question of effecting increased economy is one of paramount importance. Accurate experiments have demonstrated that there is as much heating power in one pound of coal as is *utilized* in heating seventeen pounds of iron in the puddling furnace, while in practice there are very few furnaces where more than one pound of iron is puddled for one pound of coal. This startling assertion was brought out at a recent meeting of the British Iron and Steel Institute, in the course of the reading of a paper on mechanical puddling—a subject which is attracting much attention among iron-masters on both sides of the Atlantic. As it is well known that puddling cannot be carried on at a less heat than that usually obtained, and as the products of combustion which escape into the chimney attain an average temperature of $2,033^{\circ}$ Fah., the question has arisen whether some of this waste heat cannot be utilized, and thus effect a saving of the fuel. An invention intended to accomplish this purpose has been brought out at the works at Middlesborough, England, whereby a furnace is used, which in appearance is not different from an ordinary furnace. It is thus described in a paper read by Mr. Jeremiah Head: Above the neck the chimney is enlarged into a chamber, divided into two compartments by a vertical cross wall reaching nearly to the top. One compartment is fitted with a damper capable of barring the passage, and the other contains a cellular stovepipe. The dividing wall is perforated by two apertures, one on either side of the stovepipe, and close to the base thereof. The chamber is surmounted by an iron-cased

chimney, carried in such a way as to be independent of the brick-work for support. When the damper is open the products of combustion pass by it the nearest way to the chimney. When it is closed they are forced to pass through the two apertures on either side of the stovepipe, which they heat, as well as the stove-box in which it stands, and so to the chimney. Connected with one side of the stove-box, which is divided into two compartments, is a vertical funnel-pipe, down which a steam jet constantly blows. Air is introduced with the steam, and the mixture is forced to pass up and down the heated stovepipe, and is then conducted through the back of the furnace to an ash-pit closed by doors. A portion of the blast can be allowed, by opening a valve, to enter the crown of the furnace just above the fire-bridge, in jets, through specially made tuyere bricks. The steam must be dry, and as high in pressure as possible. The jet is one-eighth of an inch in diameter at the orifice. About sixty-five pounds of water must be evaporated per hour to maintain it. The pressure of the blast on leaving the stove chamber is represented by a column of water one-quarter of an inch high, and the average heat is 550° Fah. The products of combustion immediately above the stovepipe average 1,577° Fah.

Furnaces conducted upon the plan above described, which have been in constant operation during ten months, show a decided economy compared with the operation of an ordinary puddling furnace, consuming but 16 cwt. 2 qr. 2 lbs. of coal per ton of puddled bar, including lighting up and firing during all stoppages, while but 21 cwt. 1 qr. 21 lbs. of iron were used; whereas the ordinary furnaces at the same works use 24 cwt. 2 qrs. of the same coal, and 3½ per cent. more iron to produce the same weight of puddled bar.

In the same paper a reference is made to the satisfactory workings of the Danks and Spencer rotating furnaces, both of which are said to produce highly gratifying results. It is well known that the committee sent out from England to examine and report upon the Danks furnace have endorsed it as an invention of great value, and satisfactory arrangements have been concluded by the patentee, whereby his invention is being put into practical operation in some of the prominent British iron works.

—SATISFACTORY progress is being made in the construction of the Sutro tunnel, notwithstanding the serious quarrel between the projector and the mining companies working on the Comstock lode. During the three months ending March 1st, a large force of workmen was employed, the expenditures amounting to \$122,828. At the end of March the length of the tunnel was 2,811 feet; the depth of shaft No. 1, 132 feet; of shaft No. 2, 307 feet; of shaft No. 3, 156 feet; of shaft No. 4, 150 feet. When these shafts shall have been finished, and ventilation secured, drifting will be prosecuted with greater rapidity. A thorough test of diamond drills will be made, as they are to be used in all parts of the work. The question whether the general government should afford material aid to this great undertaking is yet undecided. Each view of the case has its partisans, and the matter will doubtless involve heated and protracted discussions. That the character of the vein which it is intended to strike, fully warrants the enterprise, is the opinion of all the leading mining engineers who have studied its geognostic relations. That the expense of working the mines will be lessened to a very large extent, is also conceded; and yet, with these facts before them, the companies whose mines are situated on the lode evince not only an indifference, but even a positive hostility to the scheme.

A very elaborate paper on the Comstock lode has recently appeared in the *Berg-geist*, published at Cologne, in which the author severely criticises the report made by the United States commission on this subject, particular stress being laid upon the fact that the commission accepted the statements of the superintendents of the mines, and that particularly as regards the subject of ventilation these superintendents have advanced views wholly at variance with the theory and practice of mining. In alluding to this subject the Engineering and Mining Journal says: "The particular proposition which Burkart attacks is unfortunately repeated several times in the report and appendix, viz., that when the tunnel is done, and the shafts connected with it, the air current will go

straight up the shafts, and that it will be impracticable to carry air to the headings where the men are at work. Of course, this statement is ridiculous; and we are mortified that a foreign critic should find it in an official and professional document. The superintendents of the Comstock mines are in many instances agreeable gentlemen, good business men, and excellent mechanics and engineers, so far as their experience goes. It is their boast that none of them are 'scientific theorists'; and no doubt their practical skill is better than mere theory for many purposes. But what they lack, though it may surprise them to hear it, is not theory, but practice. If they had had any real practical experience in deep mining, and the natural ventilation of mines, they would not have talked such rubbish to the commission on that subject. When a man pronounces his particular location to be 'an anomaly'; says you can't tell which way the air will go in his mine; that a deep tunnel connecting the bottom of his mine with daylight on a level 2,000 feet below the top, will give him no better ventilation than a level connecting the bottoms of two shafts; or that the natural air current developed by such an enormous difference in altitude and temperature cannot be conducted wherever it is wanted throughout the mine, he is really propounding the wildest kind of theory; and what he needs is practice."

—An example of the absurdity of many of the patents granted by the government may be instanced by the following quotation from the specification of a recent process for case-hardening, or "steelifying" iron, as the inventor styles it: "The following chemicals form the base of my improvement: Blue vitriol, oxalic acid, carbonate of ammonia, pure saltpetre, muriate of tin (crystals)—equal parts.

"Mode of preparation.—Dissolve the chemicals in a (q. s.) sufficient quantity of 96 per cent. alcohol. After all is dissolved, put in pine sawdust, as much as the solution will hold without dripping. Then pack the iron to be steelified with the compound in an iron case, made perfectly air-tight by luting with fire-clay. Then put the case into a furnace, and keep it at a cherry red for about thirty minutes, for steelifying the iron, after which let it cool gradually. This compound can be used a number of times and produce good results.

"For case-hardening bar-iron, use the same materials and process, and while red hot, plunge the iron into the following compound: Three gallons of strong alkali, one pound saltpetre (nitrate of potassa), and muriate of tin one-quarter pound."

The foregoing empirical mixture suggests a comparison with the "eye of newt, and toe of frog" prescription compounded by the witches in *Macbeth*. According to the best authorities on the metallurgy of iron, case-hardening is simply a superficial conversion of iron into steel, and only differs from cementation in being carried on for a shorter time by which treatment it acquires the hardness and polish of steel externally, with a core of soft fibrous iron in the centre. The most common materials used for this purpose are prussiate of potash, animal charcoal—either in the form of bones, hoofs, horns, or leather, partly charred—or raw bones, or wood charcoal. In the reaction which ensues, a minute proportion of carbon, which is eliminated in the furnace, is absorbed by the metal in just sufficient quantity to convert the surface into steel. But how the addition of sulphate of copper or muriate of tin can expedite the matter, or produce any beneficial results whatever, is a subject which requires elucidation. The specification directs that the materials be dissolved in alcohol, and that the solution be used. But when we consider the fact that sulphate of copper and nitrate of potash are practically insoluble in strong alcohol, it will be seen that their presence must be obtained in homœopathic doses, and could scarcely exert any effect, whether good or bad. Case-hardening is satisfactorily performed by old and approved methods, and fortunately there is no necessity for raking up a collection of useless drugs to mystify a simple and well known process.

—THERE seems to be very little doubt that in some of the southern States iron can be produced far cheaper than in even the most celebrated iron localities of the North. We recently alluded to the economic advantages of Alabama, and to the opinion expressed

by Mr. Hewitt, that iron will soon be made in that State at a lower cost than anywhere else in the world. Steps are now being taken to develop some of the ore deposits in the north-eastern part of the State, and capital is being subscribed for the erection of a furnace, the site of which has been already chosen. It is said that ore enough to produce a ton of iron costs in Pittsburgh about eighteen dollars, while in Alabama, delivered at the tunnel head, it costs but two, while fuel and labor are cheap and abundant. Some of the ore banks of Alabama have hitherto been worked with variable results. As long ago as 1849 there were, according to Whitney, eight bloomaries and two furnaces in operation; while in 1852 an additional furnace was erected. These furnaces were situated in Cherokee, Benton, and Shelby counties, respectively, one working the red dyestone fossil ore, as described by Lesley, while the others smelted the brown hematites found in the vicinity. With the stimulus given to the production of iron by the unusual demand both at home and abroad, many of these hitherto neglected properties will assert their claims to the attention of capitalists.

—In the State of Boyaca, United States of Columbia, the emerald mines of Muzo are being worked by a French company, whose lease will expire in 1874. A very large number of gems has been found in the principal mine now worked, many of them of great value. The emeralds are sent to Paris to be cut. Their production is very variable: whole months may elapse without an emerald being found, while 100,000 carats may be obtained in a few days. Until the gems pass into the hands of the lapidary, it is exceedingly difficult to fix their value. A stone of very dark color, and perfectly free from flaws—which is very rare—may be worth \$100 a carat; while those of light color, full of flaws, and divided into small fragments, are of very little value. The company working this mine is said to be in a very prosperous condition, and desirous of obtaining an extension of the lease; but in this respect they will suffer disappointment, as the Columbian congress passed a law in 1870, by which all the emerald mines of the republic are to be thrown open to the world after the expiration of the French contract in 1874. These mines are worked both in the open air and by galleries, and there is abundant evidence of their having been worked by the Indians and Spaniards.

—By an act of congress, passed in February, 1871, it is provided that after February 28th, 1872, "every plate of boiler iron or steel made for use in the construction of steamboat boilers shall be distinctly and permanently stamped by the manufacturer thereof, with the name of the manufacturer, the place where it was manufactured, and the number of pounds tensile strain it will bear to the sectional square inch." By another section of the enactment, boiler manufacturers are forbidden to either build or repair boilers with unstamped plates, or even with such plates until after they shall have been inspected. The enforcement of this law has already caused trouble. Manufacturers of boiler plates have already notified some of the largest boiler makers that they will not supply them with any more iron plates. This step has proved a serious annoyance, as several steamers are now waiting in New York to be supplied with boilers, and yet the stamped plates cannot be obtained.

—THE coal mines of Corunna (Michigan) have been recently visited by a number of mining engineers, who, it is said, have expressed a favorable opinion regarding the character of the coal, and of the capabilities of the mines for producing a large supply. The mines have already been developed to a considerable extent, and it has been estimated that they will be able to yield "5,000 tons a year for thirty years," which, if reliable, certainly bespeaks for them a good reputation for productiveness. A railroad from East Saginaw to Corunna is projected, which will enable the coal to be delivered at the former place at \$4.75 per ton, the cost at the mine being \$3.50 to \$4.00 per ton. This coal is said to resemble the block-coal of Indiana. The slack is reported to be well adapted for raising steam, and for boiling the brines at the salt works, while it possesses the advantage of being cheaper than wood.

—ACCORDING to Prof. George H. Cook, the State geologist of New Jersey, the product of the iron mines of the State in 1871 was 450,000 tons. In 1867 it was but 275,000 tons, showing a very handsome increase in the interval. Four-fifths of this ore is produced by Morris county alone. The iron region of northern New Jersey possesses the same geological features that characterize the counties of Dutchess, Orange, and Putnam, in New York, and the ore is very similar in its character. The rocks in which it occurs are chiefly gneiss and hornblendic schists, with a steep dip, and a general north-easterly and south-westerly trend. The ore is magnetic, and exists in heavy bands, parallel with, and having the same dip as the enclosing rocks, being of contemporaneous age. The production of hematite ore in the State is small, being about 15,000 tons.

—AN accidental discovery of coal has been made on the farm of Mr. Everton, in Posey county, Indiana. Borings were being made for an artesian well, when at a depth of seventy feet a thin seam of coal was pierced. In consequence of this discovery the borings were continued, when at a depth of two hundred and seventy feet a vein of superior caking coal, five feet thick, was struck. Prof. Cox, the State geologist, has recently visited this property, having made an analysis of the coal, which yields 64.60 per cent. of coke, and 35.40 per cent. of volatile matter. By his advice, Mr. Everton still continues boring, and had, at last accounts, reached a depth of three hundred and seventy-four feet. Mining operations will be immediately commenced on this property, and a company is now being organized to raise the coal.

—THE statistics of the anthracite coal trade of Pennsylvania for the past few years are given by the *Miners' Journal* as follows:—

Year.	Tons.	Year.	Tons.
1865	9,501,500	1869	18,651,747
1866	12,379,480	1870	15,268,437
1867	12,650,581	1871	14,965,501
1868	13,405,016		

The total number of steam engines employed at the collieries is 1,503, with an aggregate power of 66,780 horses.

—REDUCTION works on a creditable scale have been erected at Helena, (Montana,) where they were recently put into operation. The first cupellation produced a silver button weighing 308 pounds, its value being upwards of \$6,000. The successful inauguration of these metallurgical works was the occasion of no little excitement in the vicinity. Large crowds congregated to witness the button, which was placed on exhibition at an assay office. It is expected that a button of this size will be produced every ten days, and if the initial works confirm the expectations held out, it is probable that other establishments will be built.

—DETROIT glories in the establishment of a mining exchange, which has been recently fitted up with a laboratory, assay office, and a mineralogical, geological, and technical museum. It is said that a school of mines will also be added. This enterprise is supported by an initiation fee of twenty-five dollars, and annual dues of ten dollars from each member, together with the profits which may accrue from the analytical laboratory. There are already about sixty members of the association, and this number is expected to be largely increased.

—FROM the bulletin of the French committee of forges we learn that in Germany the production of cast-steel in 1869 amounted to 163,319 tons, while in 1860 the total quantity was only 25,812 tons. In France, in 1869, the production of steel—chiefly Bessemer steel—was 52,000 tons, which is exactly twenty-nine times as much as was made in 1864. In the first half of 1870 her production was 44,419 tons. In Germany the great works of Krupp, at Essen, largely excel all others in the quantity of metal produced.

—COPPER smelting works which were started on a small scale in St. Louis last year, but which were shortly suspended, are about being greatly rebuilt and enlarged, having been purchased by a wealthy company. A local paper states that the ores shipped to St. Louis contain from ten to twenty per cent. of copper, and that "nothing is wanted but capital and brains to bring them into profitable use."

INSURANCE.

WE are burning up as fast as we decently and consistently can; and as we, the public, burn, the fire insurers realize that the chances for making money out of the current fire premiums is growing fast from doubtful to impossible. So realizing, there is, on the part of fire underwriters, a nervous overlooking of the situation and forecasting of the future that evince that they are awake to the necessity of something being done. Prompted by Chicago, the National Board resumed its ignored functions; forced, driven by inevitable events, company follows company into the union of the National Board, assenting to its present propositions.

The new expedient, for which universal coöperation is invited, is independent local rating boards, supervised by the general agent of the National Board—discarding the former rule of rating from a central bureau. This gives the interpretation of local conditions to parties on the ground, and it is presumed will result in tariffs better fitting the aggregate hazard and the specific hazards of each locality rated. Now, if the fire hazard of a town, aggregate and in detail, were a matter mathematically ascertainable and provable, local boards would be the exact instruments for the end sought; but as local boards cannot give the mathematically exact rating any more than national boards can, it is well to consider the disadvantages as well as the advantages of independent local rating—not as any argument against the present arrangement, but as something of a caution serving to lessen, perhaps, the aggregate of resulting mistakes.

1. Familiarity with contingent or possible danger depreciates it: the natural tendency of the resident is to under-estimate the hazard of his locality. As our English cousins sometimes word it, we know something of “fires,” but we know nothing of “conflagrations;” hence the biggest fire is always a surprise, and the surprise is but proof of ignorance of the probable combustibility. Somerset, Pa., before the 9th of May was a town in which the insurance solicitor was informed, “we have no fires here”—which itself, to an outsider, was evidence that the time was coming for them—and had local estimate, based upon local experience, constructed a tariff, premium would have been to risk about as one to a hundred. As another illustration, or reference, how would the fire estimate of Reading, Pa., previous to the present year, have accorded with the fire loss of the present year? Continually, new fires in one quarter or another upset the old rates.

2. Limited territorial schedules are deficient in requisite breadth of average. This has two opposite influences, according to accident: one to rate a hazard as merely nominal, the other greatly to exaggerate it. Then, as regards some kind of risks, their actual fire liability can be approximated only from the basis of experience elsewhere.

3. In our present fire indemnity national insurance predominates over local, and this has come from inability to measure the local peril. The principle is acted upon that no locality can insure itself—can meet all the possibilities of its own case. A rule of compensation is therefore carried out, by which possible deficiency of premium in one place may be balanced by possible surplus in another place—the probability of each place being either the losing one or the gaining one being considered equal. Any mode of rating

which excludes this dependence of one place upon another,—which is not contributive to the common protection, is simply local rating for exclusively local underwriters—a merely nominal insurance, low-priced it may be, but always dear at any price.

4. In so far as independent rating is isolated rating, it precludes the compensations and corrections of wrong estimates. The value or utility to the National Board of local boards fixing their respective tariffs is not in the supposed accuracy of each local judgment, but in the average results. Apart from exceptional cases, the experience will diverge from the calculation, and errors serve to adjust an equitable compensation. That is to say, one tariff is the practical corrective of another. Local boards trying rightly to rate, *i. e.* to adjust insurance, in conformity with local relations, serve a useful purpose; but when they attempt to allow local conditions to set aside the inevitable conditions of insurance, they make a destructive mistake. Exceptional local fire immunity is no measurement of actual hazard; a place must be rated by its capability of burning according to the development of general fire data and history, in so far as the local basis is deficient, which it generally is.

Board rating, as distinguished from individual company writing, should be the average of combined experience against the exceptional experience of each company; but always conceived by the respective parties to it as only a conventional arrangement, imperfectly indicative of the necessary conditions of the business, the bond has been found weak where personal honor is wanting. Against the tariffs are always arrayed the unequal position of the companies, the pressure of brokers, the demands of the insured. What is wanted is a tariff from which there is no getting away in safety—and this understood. The reason of a rate should accompany it. There certainly must be some way of showing to incompetent underwriters that there is no use in receiving 70 cents and paying out 90 cents for them—some way of convincing them that temporary avoidance of paying the 90 cents is not ultimate escape.

That company is the strongest which makes the most money—the largest percentage on its business; yet no intelligent underwriter would attempt to overrate. His position is against any trial of this kind. Excessive premium gives the opportunity for weak companies and recusants to cut under and seize the business.

Once established that a board is a union for necessary rates, not high ones, that the scale of minimum charges represents the lowest rational estimate for fire cost and business cost, the matter would be removed from the uncertainty of any voluntary pledge, and would only be evaded by the lowest of frauds, which simply exist to receive *whatever* they can, and avoid all obligation.

The failure of agreements in the past has been the failure of attempts to charge one price for different securities with rates considered as nominal, not absolute. Thus, companies answering all legal requirements can readily be classed as A, B, C, or D, according to different grades of financial responsibility. Now, as people will not pay the same rate for the inferior article as for the superior one, D could not compete, excepting with great difficulty, with A under like rates; D was therefore driven from the arrangement, and A, depreciating itself to the level of D, followed D down. In such a course D is first bankrupted, while A, temporarily freed from such competition, tries to regain lost ground; but the D's reappear, and the war goes on. As the true plan of allowing each class of companies to operate on its own ground cannot at present be attained, there remains but the common ground where D *must* fight A on the line of A, taking the chance of surviving against the positive death by departure.

When a company is classed (and so published) according to its premium standard, we do not think there will be any especial hurry in underrating.

—FOURTH annual report of insurance of the State of Maine, January 1, 1873, Albert W. Paine, insurance commissioner, is at hand. Mr. Paine's reports are always *suave* *generis*. He does his own thinking after his own fashion, and consequently his ideas get

delightfully out of the beaten track. Insurance department wisdom generally goes so much in one rut that we rather like the Maine commissioner. His logic is sometimes mixed, his views become notional rather than normal; but then he is entertaining, and frequently interesting, and this cannot be always said of annual State insurance documents. Now and then, through a grotesque guise, a thought crops out worthy of the general consideration of the insurance interest. We may smile at the idea of a "moral climate," which climate affects the moral hazard; but the commissioner is right and sound in his persistence in finding out the *distinctive* local hazard of his territory. Striking out into new fields of investigation, Mr. Paine demolishes the present mortality basis of life insurance—does this while discussing such an unaggressive and conservative topic as Life Premium Rates—and absolutely removes the good old corner-stone average from the insurance temple. His vision is that as "other peoples' average" has nothing to do with a particular individual constitution, therefore the particular risk cannot be justly premiated on the basis of a mortality table giving the general average death-decrement of a particular age. His conclusion is—"the tables [of mortality] must establish the 'average line,' around which the premium, as it were, *revolves*, and *thus* furnish the guide or rule." The new plan insures the individual of himself, and not with others, as we are now doing, and if anything like a class average were not sublimely ignored, would give us such a refreshing multitude of death tables—so many for each age—that everyone could have his own range and limit of life marked out, and so—life insurance would come to an end—they who would need it, could not get it; they who could get it, would not need it.

The principle which underlies the use of life insurance is this: "Ye know not the hour nor the day when ye shall die." This is of *common, like, and equal* application to every insurable person; and until the essential meaning of this can be graduated, and its degrees tabled, Mr. Paine's Chinese puzzle will lack a solution. Insurance cannot get beyond average, accurately to assume to measure the particular life duration is to prophecy.

Such fancies carry with them their own refutation, and they even claim a respect as the outgrowth of a desire for all practical justice. There is no department in the country pervaded with a spirit of equity equal to that of Maine; scarcely does even the Massachusetts administration equal it in intense and earnest desire to do right, and this alone would redeem many errors. Out of this spirit come the noble words of the report on the subject of Retaliatory Laws; words which dignify the writer and honor his office; words which leave Pennsylvania to herself, in her barbarous exactions, as no more worthy of imitation than the Delaware whipping-post; words which maintain that to persecute citizens of a State for the acts of their State, is to participate in a wrong Maine was above initiating.

With this—something too much of an introduction—we proceed with our abstract of the report.

Companies doing business in the State during 1871:—

Domestic Companies.

One mutual life company, three stock marine companies, three stock fire-marine companies, two mutual marine companies, thirty-six mutual fire companies—of which twenty-two are town companies.

Foreign Companies.

Forty-four life companies, sixty-seven fire and fire-marine companies, one accident company. No exclusive marine company of another State has applied for admission.

The Rockland Fire and Marine Insurance Company of Rockland, after a business of twenty years, having come to the limit of its charter, has voted to withdraw and divide its effects. Another company, under a similar name, was incorporated at the recent session of the legislature, and proposes to enter upon business in the same city.

MAINE BUSINESS, 1871.

FIRE.

Domestic Stock Companies.

	Amount insured.	Premiums received.	Losses paid.
Eastern, Bangor.....	\$1,529,820	\$20,711 86	\$6,522 49
National, ".....	1,994,580	32,146 66	9,409 58
Union, ".....	2,689,810	86,890 16	83,927 74
Total.....	\$6,163,710	\$89,748 18	\$49,859 81

Domestic Mutual Companies.

Amount insured.....	\$21,110,177 00
Losses paid.....	41,501 07

Foreign Companies.

Amount insured.....	\$48,068,382 00
Premiums received.....	644,257 18
Losses paid.....	221,253 53

MARINE.

Domestic Companies.

	Amount insured.	Premiums received.	Losses paid.
Boothbay Mutual Fishing, Boothbay.....	\$ 175,985		
Eastern, Bangor.....	2,552,924	\$ 90,866 73	\$59,909 68
Maine Mutual, Bangor.....	1,124,853		
Merchants' Marine, Bangor.....	2,669,976	108,220 96	86,696 66
National, Bangor.....	2,003,995	57,093 78	12,982 85
Ocean, Portland.....	2,197,163	65,769 05	41,873 98
Rockland, Rockland.....	1,523,549	88,868 98	62,888 11
Union, Bangor.....	3,014,721	116,927 89	94,583 69
Total.....	\$15,263,166	\$522,755 89	\$358,684 47

Foreign Companies.

Amount insured.....	\$444,558 00
Premiums received.....	11,146 01
Losses paid.....	8,766 17

LIFE.

Policies issued in 1871.....	3,647	\$ 4,820,356 00
" outstanding Dec. 31.....	15,275	26,819,641 00
Premiums received.....		1,142,084 93
Losses and claims paid.....		216,690 70

ACCIDENT.

Premiums received.....	12,561 19
Losses paid.....	6,814 55

In marine insurance, in addition to the incorporated companies doing business in the State, there have been at work through the year two vigorous companies of The Lloyds, voluntary associations, not amenable to this department. These associations have, however, reported to the commission the following statistics of their business for the year, those of the Maine Lloyds, however, embracing a small part done in other States:—

PORTLAND LLOYDS—Portland.

Risks underwritten.....	\$2,218,111 00
Premiums received.....	86,372 38
Losses paid.....	4,124 73

MAINE LLOYDS—Bangor.

Risks underwritten, about.....	\$3,000,000 00
Premiums received.....	128,153 82
Losses paid.....	89,797 95

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Our law provides for inquests when, in cases of fire, complaint is made under oath charging some particular person with having criminally caused it. It is suggested that further provision be made by law, requiring an inquest in every case of fire to be made into the causes of it, under the charge of certain persons to be designated, promptly and rigidly, without waiting until suspicion and facts shall be sufficiently developed to justify a complainant to make oath to his belief. The present precautions altogether defeat the object of the law; for while the case is developing itself sufficiently to fix suspicion, the distinctive marks, as well as the memory of witnesses, become effaced, so that after weeks and months of delay have elapsed in preparing for court, no certain evidence is to be had. What seems to be wanted is that, immediately upon disaster, a suitable authority be present at the scene to investigate both its natural and moral features, with power to interrogate any and all persons under oath, as to their knowledge of the cause, as is done in cases of railroad disasters and other cases of violence resulting in death.

BANKRUPTS' POLICIES.

The manner in which life policies are treated by government, State and national, in cases of insolvency and bankruptcy, it is believed, operates to deter many from securing or continuing such provisions for their families. It often happens that policyholders, becoming bankrupt under the present bankrupt law, their life policies are taken from them and passed over to their assignees as assets for the benefit of creditors. The prudent provision thus made for the family is taken away just as it becomes most important to be upheld. Great injustice is felt to be done in this result, and an amendment of the law seems loudly called for in this particular. In many of the States the policy is protected from the claims of creditors by the wise provisions of their statutes, and where these provisions were enacted before the bankrupt law was passed the policy is protected from its effects. In other States the enactment of such laws has been had since the bankrupt law existed. Maine is one of these, and in such cases the policy is not protected. The proposition to exempt all life policies from the effect of the bankrupt law, where honestly obtained and held, seems too reasonable and just to need any argument in its favor. This is peculiarly the case when it is considered that in the hands of the assignee it is probably of no value to any one, and is thus a loss to everyone interested. The law would certainly not compel the company to keep the policy alive in favor of the assignee without its consent any more than a fire policy on property after its sale. The usual terms of the policy are to this effect. By transfer the policy becomes of the nature of a wager-policy, and valueless at the option of the insurer. Such being the case, as it is believed the law is, there would seem to be no reason to prevent the proposed exemption, and the earnest hope is expressed that congress will at once mete out this measure of justice to the unfortunate but honest debtor.

RETALIATORY LAWS.

In the second annual report of this department, occasion was taken to speak of the subject of "reciprocal" or retaliatory legislation in the matter of insurance. In framing the statute of 1870, under which the department is now working, the views of that report were heeded and the principle rejected. During the recent session of the legislature the subject was again introduced with the same unfavorable result. As the commissioner aided in bringing this about, he deems it his duty briefly to give his reasons for his action in the matter.

Many confound the subject of retaliatory laws with the general subject of taxation of foreign insurance companies, but the two have necessarily no connection. The great object of retaliatory legislation is not so much the collection of revenue as a punitive measure, or the infliction of a penalty to attain a supposed end favorable to our own companies. If the former were sought, a uniform tax assessed on all foreign companies alike, in proportion to their business here, would be the legitimate mode of proceeding. This

our legislature, after the fullest discussion, has persistently rejected as against the policy of the State. The law in question, however, does not propose this, but only to impose on all companies doing business here from other States the same taxes, fees, and requirements that are imposed in those States upon our companies doing business there. It is essentially an enactment of the accursed principle of revenge, so abhorrent to all the teachings of religion, and violative of every principle of pure morality. It is indeed worse than this, inasmuch as the object of the revengeful act is not the assaulting party, but an altogether different and innocent one. A state of anarchy or war can alone justify such a resort, where law and reason are set aside, and men are remanded back to a primitive state of unbridled disorder. The principle had its consummation in that recent outbreak of communal rage at Paris, when the archbishop and his confrères were slaughtered in cold blood in revenge for — the successes of the government outside the walls, a fact with which the unhappy victims had no connection, the same as with those singled out as objects under the present proposed legislation.

Every State should be allowed, without interference, to manage its own affairs in its own way, under the guiding principles of the national constitution, and if either seeks to adopt any species of legislation of which the citizens of other States disapprove, the latter have only to keep away, or seek to change the obnoxious acts as they would the similar acts of their own State. The attempt of one State to impose its notions of legislation upon another, by pains and penalties inflicted upon its private citizens, it is believed, finds no justification in any truly christian code. We are a family of States, and as unjust as it would be for the children of one family in a neighborhood to fight those of another in revenge for some principle of family government adopted by the parents against their children's earnest protest perhaps, so unjust is it regarded to adopt a similar principle among the different States of the Union.

The passage of the law in question might be more readily justified, if, when adopted, it would be of any practical benefit in bringing about the desired result. But no such effect can be anticipated, as the whole history of the subject demonstrates. Beginning with a single State, the evil has been constantly increasing, until it has involved a large number of the States without beginning to produce the reform desired. The medicine taken for the cure has only increased the malady. It has eaten of its own growth and thrived,

"As if increase of appetite had grown
By what it fed on."

Like an encounter between individuals of the lower order of animals, the interference of a new combatant only increases the rage, making the strife more bitter, and having perhaps the one good result of sooner ending it by an earlier exhaustion of the parties. Our State can hardly afford to join in such an affray.

Besides the objections already urged, there are others of importance leading to the same condemnation. As matter of justice between States, if the privilege of doing business in other States is one worth paying for, as without question it is, then the larger the State, the larger, it would seem, ought the fee to be. Because Pennsylvania requires companies to pay \$500 for admission, what measure of justice can excuse the adjoining State of Delaware from retaliating the same imposition? It may be perhaps truly answered that it is not "justice," but "revenge," that is sought.

Then, again, if the principle in question is just, there is no reason why the subject of insurance should monopolize it. Any other subject of government supervision has an equal claim to invoke it. Indeed, our own legislature at its last session did so by enacting a law forbidding the citizen of any other country or State from recovering damages in this State sustained from defect in the highway, unless the law of his State or country gave the same remedy; and so it may go on until our statute book may be loaded with enactments of a hostile character made to meet objectionable provisions in the legislation of other States and provinces. The gallows for thieves, and the whipping-post may thus

be erected on the soil of Maine to render "reciprocal" justice to offending citizens of such other States as indulge in such luxuries.

That the effect of the law, if passed by our legislature, may be known, it is well to state that if in force the commissioner would be required to collect not only such taxes, but such fees, also, as are imposed by the laws of the States where the company is located. Instead of one dollar for each license to an agent as now, all agents of Pennsylvania companies would be required to pay five dollars, those of Massachusetts two dollars, and of New York five dollars, unless the superintendent should in his discretion remit a part; so that the price of licenses here for New York company agents will depend not on our own laws, but upon the discretion of one man in Albany. The absurdity of such a law for Maine would seem too evident to admit of its enactment.

DEFECTS OF PRESENT MAINE STATUTES.

The occasion is taken here to speak of a few defects in the present statutes, which seem to need amendment:—

1. The provision of the present law relating to "liens of mortgagees" upon policies embraces only domestic companies, and such only of these as cover buildings standing on land of the owner. The law does not meet any policies issued by other than our own State companies, nor any other property than buildings such as are described. The law should apply to all companies, and to vessels, personal property of every kind, and houses standing on leased land, and the lien should be of a nature not requiring notice to, and assent by the, insurer. And a more certain method is needed of enforcing the lien.

2. A defect is found in that part of the law providing for the service of writs on companies, so as to make them in all cases subject to the jurisdiction of our courts. As the law now is, this right may in some cases be avoided by the company.

3. A recent decision of our court prevents a party having a policy assigned to him from bringing action in his own name, but he must sue in the name of the original party insured, making necessary a multiplicity of suits in certain cases where all ought justly to be sued together.

4. The subject of investments is unprovided for by the present law, except partially, and new provisions are necessary.

5. Some other matters of minor importance would also seem necessary in order to perfect the law for the security of the public.

A bill was very carefully prepared and presented at the last session of the legislature, embracing these several amendments, which, after being very deliberately considered in committee, was reported and passed in the senate, but was, in the haste of proceedings at the close of the session, indefinitely postponed in the house. It is hoped that at the next session the bill may be enacted, and thus give greater certainty and security to the people of the State in their insurance business and interests.

—THE new Maryland insurance law is an act to authorize and empower an insurance commissioner. In respect to form of statement it is silent, and is brief as to standard. It is pieced out here and there with the suggestions, and at times with the language of the National convention's draft of a general law for the States, but as a whole is a rather harmless enactment. The commissioner, though chartered with a tolerable broad authority, is but a clerk of the comptroller of the State treasury—an appointee of the comptroller. The developments of the New York investigation being fresh in memory, while the commissioner watches the companies, the comptroller watches the commissioner; but it is not said who watches the comptroller. The commissioner looks after the orthodox rules of reserves—fire, life, and marine; calculates, or causes to be calculated, the net value of life policies, where there is no other State commissioner's certificate of valuation—receiving in good faith, according to the principle of State uniform legislation, any other State valuation, made on a basis not lower than American Experience, $4\frac{1}{2}$ per cent.

A capital of \$100,000 suffices for fire, marine, or life business, whether State or other State company, and fire or marine capital is safe from suppression clear down to a 40 per cent. impairment; and foreign companies are simply required to have assets in the United States equal to their American reinsurance reserve. The capital abroad being ignored, an insolvent European office can have a branch office legally doing business in Maryland. As the prevailing usage is to treat stock capital in life companies as of no account, the complete absorption of such capital by the liabilities is no legal detriment, but the deficit of one dollar in the legal life reserve estops further new business, with possible permission to carry old risks, if there is a prospect of retrieval. The necessary proceedings, under the laws of the State, to close the affairs of any company, must "be approved by the comptroller." As a further precaution against any caprice, tyranny, or blackmailing on the part of the commissioner, or collusion between comptroller and commissioner, the law makes the following arrangement: "And whenever he [the commissioner] shall have reason to believe that any company is insolvent or fraudulently conducted, or that its assets are not sufficient for carrying on the business of the same, or during any non-compliance with the provisions of this act, he shall make complaint thereof to the judge of the Superior court of Baltimore city, or any judge of the Circuit court of the county, where the company or agency may be located, as the case may be, which judge shall, upon the requisition of the commissioner, appoint a commission consisting of the insurance commissioner and two disinterested and competent persons, whose duty it shall be to examine every detail of the business and condition of the said company, and report in writing the result of such examination to the judge appointing them, who shall, if in his judgment the charges of fraud, neglect, or abuse, as charged by the insurance commission, is sustained by the said report, at once issue an injunction suspending the business of said company."

In addition to the great defect of having no specified form of annual statement, the law favors condensed statements, which are the greatest drawbacks to department efficiency, as they cover up and conceal one-half of the frauds in the business. As a rule, the department which furnishes the greatest detail of actual position provides the best security for the public. The law is excellent in the simple provision that makes actual market value the sole requisite in investment of capital stock, but in the attempt to manufacture a greater security for the reserve—fire, life, and marine—it goes beyond, and really limits the pervading principle of life security, that the life reserve should be made up of interest-bearing investments—charging no liability where there is no receipt. This section (34) literally applied to the life offices, would produce some results not exactly looked for by the compilers of the law.

The old difficulty as to the license fee and premium tax of other State companies, is met by a feature modifying the partially prohibitory character of the license fee. Credit for the amount of this fee (\$300) is allowed the company in paying the tax of 1½ per cent. on premium—*i. e.*, the license fee gives exemption from the premium tax on the first \$20,000 of premium receipts—subject to the retaliatory section which excludes companies of more oppressive States from the concession.

In section 82 there is an attempt to apply the corporation law to individual underwriters, —whether the individual citizen can be regulated and directed in his private business by a State official, will afford an interesting constitutional question when the time comes for a decision upon it.

But, as a whole, this is not the worst insurance law that exists: it discloses at least the spirit or desire to improve upon existing incompatibilities. Such a law as each State should have, not one legislature would enact; and the Baltimore Underwriter well expresses the position of this one in the following paragraph: "It is not pretended by those who were chiefly instrumental in framing this bill that either in form or substance it is such as to satisfy the just wishes of those who are mainly interested in its provisions.

Whatever it embodies in the way of concession to progress, was simply the best that could be obtained. To have insisted upon more, would have defeated the whole enactment."

—TARIFF of rates adopted by the Chicago board of underwriters: No commission to brokers.

Elevators.—Buildings, \$3 @ \$5; contents, \$3.50 @ \$4.

Storage Warehouses, \$1.50 @ \$2.

Other Buildings.

Railroad freight depots, brick, minimum.....	\$2 00
Railroad freight depots, frame, minimum.....	3 00
Lumber yards, minimum.....	2 00
Churches, brick, with slate or metal roof.....	1 00
Churches, add for shingle roof.....	25
Churches, add for wooden steeple.....	25
Churches, frame, detached 50 feet.....	1 50
Hotels, brick, minimum, building \$3.50; stocks on grade floor, \$2.50; furniture.....	3 00
Business buildings, brick, with non-hazardous or hazardous occupation, as per classification of the New York board of underwriters.....	\$25
Business buildings, brick, with extra hazardous occupancy, add.....	25
Business buildings, brick, with special hazardous occupancy, add.....	50
In all cases the character of the occupation to be expressed in the policy on building. Add 10 cents for non-hazardous and hazardous, and 25 cents for specially hazardous stocks, in each case to rate, on building.	
Frame stores, detached, 75 feet.....	2 00
Frame stores, detached, 25 to 50 feet.....	1 50
Frame ranges—buildings under 25 feet apart, add 50 cents for each additional building. This rule not to apply so as to raise the rate above five per cent.	
Dwellings, brick, detached 50 feet, with slate, metal, or composition roof.....	60
Add for shingle roof.....	10
All others without special exposures, with slate, metal, or composition roof.....	75
Add for shingle roof.....	10
Dwellings, frame, detached 50 feet.....	2 00
Dwellings, frame, double, detached 50 feet.....	1 25
Dwellings, frame, in blocks, 25 cents additional for each, provided that the rate shall not exceed four per cent.	
Dwellings, frame, in ranges, 20 feet or less apart.....	1 50
Dwellings, frame, in ranges over 20 feet apart, and not detached.....	1 25
<i>Term policies</i> —Three years, two annual rates; five years, three annual rates.	
<i>Participation policies</i> —Ten per cent. additional to above rates.	

—MAINE life insurance business, 1871:—

	No. pols. issued.	Premiums.	Losses.
Ætna, Hartford.....	297	\$97,921 20	\$75,980 70
American Popular, N. Y.....	—	494 73	—
Asbury, N. Y.....	75	3,416 89	—
Brooklyn, N. Y.....	10	1,850 80	—
Charter Oak, Hartford.....	252	68,724 82	6,550 00
Connecticut General, Hartford.....	7	974 97	—
Connecticut Mutual, ".....	94	179,240 00	22,800 00
Continental, ".....	59	18,497 97	10,000 00
Continental, N. Y.....	796	74,875 81	5,000 00
Economical, Providence.....	6	2,094 90	2,000 00
Empire, N. Y.....	49	8,706 50	11,900 00
Equitable, N. Y.....	55	27,011 00	14,000 00
Globe, ".....	6	408 85	—
Guardian, ".....	23	4,016 85	3,000 00
Home, ".....	18	1,561 97	—
Homœopathic, N. Y.....	20	1,115 59	—
Hope, ".....	1	296 92	—
John Hancock, Boston.....	11	4,491 70	2,000 00
Life Associat'n of America, St. Louis.....	3	94 88	—
Manhattan, N. Y.....	—	1,029 43	—
Massachusetts Mutual, Springfield... ..	75	49,878 26	10,000 00
Merchants, N. Y.....	56	4,965 51	1,000 00
Mutual Benefit, Newark.....	43	58,491 88	18,000 00
Mutual Life, N. Y.....	207	108,265 19	17,500 00
National, ".....	164	38,419 28	8,500 00
National of U. S. A., Washington... ..	14	14,454 06	—
National, Montpelier.....	19	2,442 23	—
National Capitol, Washington.....	23	518 84	—
New England, Boston.....	166	162,688 24	21,000 00

New York, N. Y.	44	89,666 98	17,000 00
North America, N. Y.	59	15,004 10	.....
Northwestern, Milwaukee.	2	3,250 81	3,000 00
Phoenix, Hartford.	519	27,439 44	1,000 00
Provident Life and Trust.	10	4,424 89	.....
Security, N. Y.	72	6,948 07	.....
State, Worcester.	1	200 00	.....
Travelers' Hartford.	201	22,300 66	4,100 00
Union, Augusta.	164	34,992 31	10,500 00
United States, N. Y.	10	845 59	.....
Universal, "	26	9,608 42	2,000 00
Washington, "	29	1,888 35	1,000 00
Totals.	8,647	\$1,142,084 98	\$216,880 70

GERMAN FIRE INSURANCE.

[CONTINUED.]

A.—MUTUAL INSURANCE.

2. PRIVATE SOCIETIES.

Under the mutual system, private associations are engaged in fire insurance, principally of personal property, throughout Germany—especially in Holstein, Schleswig, and Hanover, many dating from the beginning of the eighteenth century, and some much earlier. These private associations on the mutual principle are here designated as—1, semi-public, or those which in their organization are private, but are administered by public officers; and 2, private, those which are entirely under the management of their own officials. Some of the private societies in Germany are not authorized to extend operations beyond Prussia: these are called *limited*. Others may insure beyond the limits of the State, and are called *unlimited*.

CLASSES OF COMPANIES.	Number of Insurance Societies	AMOUNT INSURED CLOSE OF			ASSESSMENTS.			LOSSES BY FIRE PAID.			Assets, December 31, 1900. Thalers.
		1907.	1908.	1909.	1907.	1908.	1909.	1907.	1908.	1909.	
		Thalers.	Thalers.	Thalers.	Thalers.	Thalers.	Thalers.	Thalers.	Thalers.	Thalers.	
a.—Real Estate.											
1. Semi-public Societies,	14	41,914,000	43,000,423	43,061,150	92,001	99,711	99,218	99,402	91,296	67,003	27,200
PRIVATE SOCIETIES.											
2. Limited to Prussia,	69	69,300,000	78,640,000	77,500,000	146,618	196,850	178,761	183,001	200,730	183,845	246,121
3. Unlimited,	5	4,444,061	8,323,862	4,618,321	25,416	7,461	12,106	12,068	6,373	4,897	90
Total real estate,	88	115,658,061	130,964,425	125,579,471	264,035	274,021	261,184	238,068	298,299	255,646	623,397
b.—Personal Property.											
PRIVATE SOCIETIES.											
1. Limited to Prussia	139	258,100,000	309,350,000	276,500,000	446,788	684,532	559,492	421,400	654,924	434,306	305,305
2. Unlimited,	4	111,639,656	129,207,525	126,400,555	266,764	286,400	231,614	196,226	254,773	224,003	65,725
Total personal property,	143	369,739,656	399,147,525	402,920,555	675,553	900,992	791,106	627,616	911,698	798,309	361,030
c.—Real and Personal Estate.											
Unlimited.											
PRIVATE SOCIETIES,*	4	234,193,678	353,132,006	306,139,776	223,542	411,349	230,206	150,224	268,191	208,346	247,829
Aggregate,	235	619,571,993	689,946,416	694,135,615	1,178,129	1,655,273	1,368,696	1,016,228	1,468,166	1,178,058	1,242,397

* Includes the Gotha Society.

*Rates pro mille of Amount Insured in Private Societies.***Assessments and Losses.**

FIRE INSURANCE COMPANIES.	Assessments.			Losses Paid.		
	1867.	1868.	1869.	1867.	1868.	1869.
a. Real Estate.—Semi-public societies.....	2.19	1.62	1.58	1.65	2.12	1.53
Private societies (limited).....	2.01	2.67	2.31	2.21	2.71	2.37
“ (unlimited).....	2.28	2.27	2.07	2.06	2.47	2.03
b. Personal Property.—Limited societies.....	1.74	2.54	2.02	1.28	2.43	1.75
Unlimited societies.....	1.83	2.49	1.94	1.70	2.34	1.76
c. Real and Personal Estate.—Unlimited.....	0.70	1.17	0.89	0.45	0.73	0.59
Total.....	1.43	1.92	1.53	1.24	1.70	1.32

The most important of the private associations, on the mutual principle, is the Fire Insurance Bank at Gotha, established in 1819, of the transactions of which a compact account is given for 1867, 1868, and 1869.

	1867.	1868.	1869.
Amounts insured at close of.....	513,351,500 thlrs.	545,591,800 thlrs.	569,915,000 thlrs.
“ in force during year....	535,152,300 “	570,034,300 “	594,625,700 “

Receipts.

Gross premiums, incl. reserve of previous year, excl. reserve for future years.....	1,618,750 thlrs.	1,692,485 thlrs.	1,771,777 thlrs.
Interest.....	79,539 “	78,176 “	79,601 “
Superannual dividends, 1861-63..	1,083 “	1,589 “	2,513 “
Total receipts.....	1,694,374 “	1,772,250 “	1,853,891 “

Expenditures.

Losses by fire, excl. loss reserve of previous years, incl. loss reserve of future years.....	200,966 thlrs.	451,209 thlrs.	339,653 thlrs.
Comm'n's. for paying out div'nds.	16,428 “	19,100 “	16,365 “
Current expenses of administrat'n	60,411 “	62,854 “	61,239 “
Agencies.....	125,888 “	135,973 “	139,677 “
Total expenditures.....	403,691 “	669,136 “	556,934 “
Surplus.....	1,290,681 “	1,103,114 “	1,296,957 “

Amt. of gross premiums on which surplus was distrib'd as div'nd.	1,613,353 thlrs.	1,697,099 thlrs.	1,776,655 thlrs.
Surplus in per cent. of preceding amount.....	80	65	73
Net premiums.....	323,069 “	539,371 “	474,820 “
Average net premium pro mille of amount insured.....	0.63	1.08	0.83
Losses by fire pro mille of amount insured.....	0.89	0.93	0.60

B.—STOCK ASSOCIATIONS.

At the close of the year 1869, the following German fire insurance stock associations were engaged in Prussia:—

German Stock Associations.	When established.	FINANCIAL CONDITION, DEC. 31, 1869.					
		CAPITAL STOCK.		Premium reserve for 1870. Thalers.	Capital reserve. Thalers.	Liabilities. Thalers.	Security reserve. Thalers.
		Subscribed Thalers.	Paid in. Thalers.				
1. Berlin.....	1812	2,000,000	400,000	148,924	95,284	.....	644,158
2. Leipzig.....	1819	1,000,000	200,000	738,391	483,523	.....	1,413,313
3. Fatherland in Elberfeld.....	1823	2,000,000	400,000	386,359	367,454	.....	1,153,811
4. Aix-la-Chapelle and Munich.....	1825	3,000,000	600,000	2,930,628	.....	.....	3,530,626
5. Fire In. As. of Bav. Hyp. B'k.....	1836	1,714,288	1,714,288	158,501	571,429	.....	2,444,216
6. Colonia in Cologne.....	1839	3,000,000	600,000	727,634	1,217,401	.....	2,545,035
7. New 5 Ins. Co. in Hamburg.....	1843	500,000	500,000	37,792	500,000	.....	1,037,792
8. Magdeburg.....	1844	5,000,000	1,000,000	1,206,554	626,023	.....	2,646,576
9. German Phoenix in F-on-M.....	1845	3,142,857	680,871	586,260	814,238	.....	1,561,117
10. Prussian Nat. F. I. in Stettin.....	1845	2,930,400	732,600	206,618	300,000	.....	1,239,268
11. Silesia in Breslau.....	1848	3,000,000	600,000	176,178	12,000	.....	788,178
12. Thuringia in Erfurt.....	1853	2,250,000	450,000	195,586	.....	276,456	399,130
13. Hamburg Bremen.....	1855	1,000,000	300,000	125,000	110,000	.....	435,000
14. Providentia in F-on-M.....	1856	4,571,429	458,498	104,467	21,799	.....	62,087
15. Dresden.....	1857	1,510,000	844,850	103,390	.....	792,743	137,497
16. Oldenburg.....	1857	854,500	170,900	67,261	4,995	.....	165,222
17. German in Berlin.....	1860	1,000,000	200,000	136,844	.....	165,466	170,873
18. Gladbach.....	1861	1,000,000	300,000	106,200	4,000	.....	297,375
19. Adler in Berlin.....	1865	1,000,000	300,000	62,787	.....	118,027	144,769
20. Prussian in Berlin.....	1866	1,000,000	200,000	28,781	.....	110,535	117,946
21. West German in Essen.....	1866	2,000,000	400,000	89,773	268	.....	490,768
		43,873,472	10,733,893	8,136,076	4,631,935	1,616,323	21,875,561

Before entering upon the details of administration of these associations during the last years, a general survey of its results is presented, as far as the data on hand permitted its preparation.

COMPARATIVE STATEMENTS.

Results of German Fire Insurance Stock Associations—1860 to 1869.

Name of Association.	Amounts Insured in Millions of Thalers.									
	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
Berlin.....	96	108	118	128	134	143	147	171	177	185
Leipzig.....	411	425	439	439	438	439	443	441	472	483
Fatherland in Elberfeld.....	351	371	403	419	435	461	476	508	524	550
Aix-la-Chapelle and Munich...	867	902	949	1,008	1,089	1,070	1,088	1,050	1,037	1,064
Fire In. Dep. Bav. M. & E. B'k.	149	162	172	195	214	244	257	275	258	296
Colonia in Cologne.....	579	595	613	645	672	667	673	666	706	738
Magdeburg.....	484	616	683	750	827	999	1,044	1,296	1,418	1,624
German Phoenix in F-on-M....	343	350	384	370	377	390	392	458	451	581
Silesia in Breslau.....	298	264	282	291	294	311	331	345	340	358
Prussian National in Stettin...	241	245	281	233	232	231	235	240	244	248
Total old societies.....	3,759	4,088	4,243	4,478	4,662	4,955	5,086	5,470	5,639	6,129

Results of German Fire Insurance Stock Associations—1880 to 1889, (Continued.)

Oldenburg	87	81	89	99	89	86	79	88	95	106
German in Berlin		84	110	130	188	126	123	112	181	133
Gladbach				52	49	61	73	85	97	107
Adler in Berlin							12	18	50	84
Prussian in Berlin								22	48	47
West German in Essen								89	72	98
Total new societies	87	115	199	281	276	273	286	364	498	874
Aggregate	8,796	4,158	4,442	4,754	4,981	5,228	5,372	5,834	6,122	7,003
Thuringia in Erfurt								326	360	294
Providentia in F-on-M								127	184	192
Hamburg Bremen								37	42	46
Dresden								109	126	132
								599	672	664
								6,433	6,794	7,667

Average Premiums pro mille of Amount Insured.

Stock Associations.	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
1. Berlin	2.12	2.08	2.06	2.01	1.99	1.94	1.91	1.89	1.86	1.16
2. Leipzig								1.54	1.47	1.44
3. Fatherland in Elberfeld	2.12	2.12	2.04	2.00	1.93	1.95	1.92	1.81	1.80	1.77
4. Aix-la-Chapelle and Munich	1.76	1.76	1.71	1.71	1.68	1.61	1.60	1.56	1.58	1.47
5. Fire Ins. Bav. M. & E. Bank	2.00	2.00	1.95	1.90	1.85	1.79	1.69	1.64	1.66	1.63
6. Colonia	1.85	1.83	1.80	1.78	1.70	1.65	1.63	1.62	1.60	1.60
7. Magdeburg	2.53	2.30	2.12	2.97	2.97	2.87	2.39	2.57	2.63	2.49
8. Phoenix in Frankfurt								1.60	1.84	1.40
9. Prussian National in Stettin	2.57	2.49	2.39	2.15	2.14	2.15	2.02	1.99	2.01	1.95
10. Silesia	2.68	2.58	2.63	2.64	2.47	2.43	2.42	2.60	2.56	2.41
11. Thuringia								1.80	1.92	2.17
12. Providentia								1.77	1.63	1.57
13. Hamburg Bremen								5.16	5.87	6.95
14. Dresden								1.99	1.91	2.03
15. Oldenburg	2.56	2.79	2.00	2.25	2.48	2.40	2.55	2.45	2.43	2.25
16. German in Berlin		3.17	3.38	3.67	4.18	3.79	3.22	3.27	2.96	2.96
17. Gladbach				2.68	2.39	2.34	2.37	2.08	1.90	1.91
18. Adler in Berlin							2.51	2.41	1.98	2.90
19. Prussian in Berlin								3.08	1.71	2.16
20. West German								1.66	1.46	1.43
General average	2.37	2.25	2.22	2.19	2.17	2.14	2.15	1.97	1.98	1.98

Average Payments for losses by fires pro mille of Amount Insured.

Stock Associations.	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
1. Berlin	1.13	1.29	1.35	1.34	1.19	1.33	1.26	1.09	1.60	1.08
2. Leipzig								0.96	1.14	0.84
3. Fatherland in Elberfeld	1.38	1.36	1.37	1.33	1.22	1.45	1.31	1.33	1.53	1.21
4. Aix-la-Chapelle and Munich	1.09	0.98	1.00	1.01	0.90	1.12	0.97	0.96	1.12	0.84
5. Fire Ins. Bav. M.B.								0.79	1.80	0.75
6. Colonia	1.05	1.01	1.03	1.08	0.94	1.10	1.01	0.96	1.16	0.90
7. Magdeburg	2.47	2.33	2.69	2.14	2.23	2.39	2.30	1.92	2.37	2.03
8. Phoenix in Frankfurt-on-Main								1.07	1.45	0.84
9. Prussian National in Stettin	1.84	1.73	1.70	1.45	1.46	1.72	1.55	1.23	1.52	1.36
10. Silesia	1.93	1.89	1.87	2.14	1.78	2.22	1.90	2.16	2.24	1.78
11. Thuringia								1.39	1.61	1.77
12. Providentia								1.34	1.20	1.13
13. Hamburg Bremen								3.04	4.91	4.80
14. Dresden								1.38	1.64	1.60
15. Oldenburg	1.23	2.02	2.69	1.33	1.34	1.62	2.69	1.29	1.81	1.83
16. German in Berlin		1.27	1.75	2.75	2.33	4.20	2.88	2.51	2.14	2.28
17. Gladbach				0.93	1.35	2.01	1.54	1.40	1.84	1.28
18. Adler in Berlin							1.45	2.98	1.88	2.12
19. Prussian in Berlin								2.23	1.88	1.99
20. West German								0.51	1.16	1.14
General average	1.45	1.47	1.53	1.47	1.42	1.70	1.59	1.35	1.63	1.35

GERMAN FIRE INSURANCE STOCK
ASSOCIATIONS.

Three-Year Results.

[June,

GERMAN FIRE INSURANCE STOCK ASSOCIATIONS.	REVENUES.			EXPENDITURES.			Profits or loss (—). Thalers.	DISPOSITION OF PROFITS.		
	Amounts Insured. Thalers.		Total. Thalers.	Losses. Thalers.	Reinsurance premium. Thalers.	Total. Thalers.		Per cent. of capital paid in.	Int and divid ^d to shareholders.	Added to reserve. Thalers.
	Premiums. Thalers.	Total. Thalers.								
1. Berlin.....	171,043,220	390,318	317,317	109,168	78,184	236,217	61,000	14	56,000	5,000
1887	176,680,637	392,690	318,485	307,370	78,146	842,976	—34,560	15	60,000	—34,560
1888	155,378,063	341,246	341,093	104,544	86,136	615,418	60,000	50	100,000	5,000
1889	440,864,250	677,161	783,921	423,011	104,544	615,418	117,000	60	11,000	17,500
2. Leipzig.....	473,434,117	691,718	745,161	539,530	539,530	11,679	11,679	8.5	11,000	67,679
1887	473,911,707	686,433	765,176	539,530	539,530	883,263	189,883	60	150,000	38,883
1888	506,460,912	932,643	967,064	414,775	539,530	886,682	30,389	15	60,000	30,389
1889	594,027,023	944,967	967,064	537,849	537,849	1,019,929	—32,373	30	80,000	70,886
3. Alze-la-Chapelle and Munich.....	550,332,013	975,149	1,025,305	898,901	397,692	871,507	1,580,186	46	276,000	—
1887	1,060,397,044	1,038,496	1,851,153	672,047	331,377	1,580,186	276,000	46	276,000	—
1888	1,087,177,293	1,040,781	2,012,763	843,130	330,696	1,738,763	276,000	46	276,000	—
1889	1,064,301,752	1,054,164	1,776,961	553,622	331,004	1,500,960	276,000	46	276,000	—
4. Fire Ins. of M. Exch'ge Bank.....	276,111,455	451,237	480,309	188,183	81,363	406,359	74,897	40	80,000	70,898
1887	284,594,534	473,919	501,434	181,463	194,211	451,433	40,000	40	80,000	—
1888	298,460,941	486,514	514,023	129,945	33,099	438,880	77,143	46	276,000	—
1889	685,731,085	1,106,976	1,239,953	388,141	295,760	945,898	233,564	46	276,000	—
5. Colonia in Cologne.....	709,110,904	1,136,636	1,857,730	535,614	253,324	1,092,606	233,564	46	276,000	—
1887	737,713,890	1,176,713	1,892,578	535,614	253,324	1,092,606	233,564	46	276,000	—
1888	1,295,967,865	3,830,138	3,486,156	1,074,334	1,116,893	3,006,668	493,500	43.25	493,500	—
1889	1,418,113,188	3,722,540	3,892,268	1,615,131	1,600,317	3,890,545	180,000	43.25	180,000	—
6. Magdeburg.....	1,418,113,188	3,722,540	3,892,268	1,615,131	1,600,317	3,890,545	180,000	43.25	180,000	—
1887	1,418,113,188	3,722,540	3,892,268	1,615,131	1,600,317	3,890,545	180,000	43.25	180,000	—
1888	1,418,113,188	3,722,540	3,892,268	1,615,131	1,600,317	3,890,545	180,000	43.25	180,000	—
1889	1,418,113,188	3,722,540	3,892,268	1,615,131	1,600,317	3,890,545	180,000	43.25	180,000	—
7. Phoenix in Frankfurt-on-Main.....	457,592,505	723,095	796,096	235,181	194,052	857,309	142,368	38.5	385,000	—
1887	451,308,978	723,095	796,096	235,181	194,052	857,309	142,368	38.5	385,000	—
1888	451,308,978	723,095	796,096	235,181	194,052	857,309	142,368	38.5	385,000	—
1889	451,308,978	723,095	796,096	235,181	194,052	857,309	142,368	38.5	385,000	—
8. Prussian National in Stettin.....	240,202,601	476,570	693,149	181,573	133,639	438,444	133,639	16.5	130,379	—
1887	240,202,601	476,570	693,149	181,573	133,639	438,444	133,639	16.5	130,379	—
1888	240,202,601	476,570	693,149	181,573	133,639	438,444	133,639	16.5	130,379	—
1889	240,202,601	476,570	693,149	181,573	133,639	438,444	133,639	16.5	130,379	—
9. Silesia.....	245,173,150	494,579	675,606	235,273	133,011	468,715	109,891	15	109,891	—
1887	245,066,584	497,611	684,355	235,273	133,011	468,715	109,891	15	109,891	—
1888	245,066,584	497,611	684,355	235,273	133,011	468,715	109,891	15	109,891	—
1889	245,066,584	497,611	684,355	235,273	133,011	468,715	109,891	15	109,891	—
10. Thuringia.....	335,692,193	537,455	693,388	374,154	264,160	798,145	97,015	10	60,000	—
1887	335,692,193	537,455	693,388	374,154	264,160	798,145	97,015	10	60,000	—
1888	335,692,193	537,455	693,388	374,154	264,160	798,145	97,015	10	60,000	—
1889	335,692,193	537,455	693,388	374,154	264,160	798,145	97,015	10	60,000	—
11. Providentia in F-on-M.....	294,102,194	645,913	693,767	399,340	231,705	755,097	—32,340	—	—	—
1887	294,102,194	645,913	693,767	399,340	231,705	755,097	—32,340	—	—	—
1888	294,102,194	645,913	693,767	399,340	231,705	755,097	—32,340	—	—	—
1889	294,102,194	645,913	693,767	399,340	231,705	755,097	—32,340	—	—	—
12. Hamburg Bremen.....	183,523,745	399,341	330,311	183,523	63,638	230,311	21,799	4	14,347	—
1887	183,523,745	399,341	330,311	183,523	63,638	230,311	21,799	4	14,347	—
1888	183,523,745	399,341	330,311	183,523	63,638	230,311	21,799	4	14,347	—
1889	183,523,745	399,341	330,311	183,523	63,638	230,311	21,799	4	14,347	—

	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868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Receipts of Premiums,

	1867.	1868.	1869.
16 Ger. stock associations in Prussia....	6,638,859 thlrs.	7,058,674 thlrs.	7,391,636 thlrs.
6 " " " outside Pruss..	778,816 "	823,402 "	901,104 "
10 Foreign fire ins. stock associations...	501,570 "	552,527 "	681,379 "
Total.....	7,914,245 "	8,439,603 "	8,974,119 "

Losses Paid.

16 Ger. stock associations in Prussia....	3,517,716 thlrs.	4,847,916 thlrs.	3,849,534 thlrs.
6 " " " outside Pruss..	483,689 "	665,821 "	598,802 "
10 Foreign fire ins. stock associations...	885,801 "	494,833 "	411,820 "
Total.....	4,867,206 "	6,008,563 "	4,859,656 "

The total insurance for each year in Prussia amounted to:—

	1867.	1868.	1869.
Mutual insurance associations' (mill. thlrs.).....	3487.0	3598.8	3711.6
Stock associations.....	8759.1	3951.7	4247.7
Total.....	7246.1	7550.4	7959.3

	1868.	1869.	Total.
Increase for mutual associations (mill. thlrs.).....	111.8	112.8	224.6
" stock " " ".....	192.6	296.0	488.6
Total.....	304.4	408.8	713.2

[These German fire statistics, prepared for the Review from official publications of the Royal Bureau of Statistics at Berlin, by A. W. Angerer.]

—THE following, which we find in the Insurance Times, we cite with pleasure, and fully endorse. Mr. Montgomery's abilities as an underwriter qualify him for any position within the insurance interest. "The executive committee of the National Board of Fire Underwriters has elected Mr. Thomas H. Montgomery, of Philadelphia, general agent of the National board. His functions will be very important. It will be his duty to superintend the general business of the National board, advise with the local boards organized and organizing throughout the United States, touching the question of rates, and to do other business formerly entrusted to various sub-committees. Mr. Montgomery has an Atlantean task to perform, but he is just the man for the work, being full of knowledge, wisdom, and practical energy. His presence commands the respect of all who approach him, and his suavity and grace win their esteem. He was for thirteen years actively connected with the Enterprise Fire Insurance Company of Philadelphia, and was for the last six years its vice-president. His knowledge of underwriting extends to the most distant posts in every quarter, and he is able to take that wide range and to exercise that judicious discrimination required by his responsible office."

—THE Insurance Law Journal is the name of a new, well-printed monthly octavo, which will fill an important place in the insurance and legal library. Edited by Messrs. D. T. & L. H. Potter, St. Louis. The programme of this law journal is carried out with the requisite knowledge and discrimination, and embraces the topics proper to such a publication.

—THE new Ohio insurance department goes into operation June 3d. It is understood that Superintendent Church, of the new department, has appointed Colonel Ewing chief clerk.

—In the New York legislature, by a vote of 65 to 45, the assembly decided to remove Superintendent Miller from the insurance department, and the concurrence of the senate being a moral certainty, Miller anticipated his dismissal by a letter of resignation to the governor, concluding with the words: "I return my commission to you now, only because a relentless faction, denying me even the justice of a trial, is determined to seize the position I hold regardless of cause or consequences."

This resignation frustrates any radical change in the administration of the department. Removed by the joint action of both the house and the senate, the legislature could appoint the successor of the dismissed superintendent; but, resigning, a vacancy was simply created, to fill which the governor nominates the incumbent. Gov. Hoffman named Smith M. Weed, of Clinton county, for the vacancy, which nomination was quickly rejected by the senate.

From an Albany daily we have the following statement of how the situation now is from the Miller standpoint: "If the plucky Miller had stayed in office until ten o'clock on Monday evening, Tobey's joint-resolution would have been rushed through, and the plot have been consummated. But as he resigned at half-past four, the office is left in the hands of Miller's genial deputy. Miller himself has been made a political martyr, the conspirators are baffled, and no one is hurt except poor Barnes and his contemptible coadjutors."

"No one is hurt except," is certainly a refreshingly cool saying, in view of the dark results of the wretched business to which it relates, and of which it is part. It is worthy to have place along with those other simply audacious utterances, the sum of whose cry was—"Thou canst not say I did it!"

It had been our purpose—the verdict in the case of the New York insurance department being rendered—to express our views at length upon the disclosures and effect of the investigation, and the condition of affairs made evident by the surroundings and collaterals of the trial, but we refrain: to pursue the subject further could do no good, and surely "sufficient unto the day is the evil thereof." The robed skeleton that stalks through the insurance household will be unrobed soon enough; but we cannot help saying, even while refraining from comment: from Testimonial to Resignation, what huge mistakes some people have made!

—Iowa has nine fire insurance companies, two mutual, five with a capital of \$25,000 each, one \$35,331, another \$35,900; total stock capital, \$196,231. Iowa companies wrote in 1871, \$15,184,361 of insurance. Total fire premium of the State in 1871, \$1,152,40. Of this sum, the domestic companies received \$286,587.60; companies of other States and countries, \$865,871.01. Whole amount paid for losses in 1871, \$375,804.18; by companies of other States and countries, \$311,181.24; Iowa companies, \$64,622.94. Ratio of losses to gross premium receipts of outside companies, 38 per cent.; of Iowa companies, about 22 per cent. The following figures show the premium receipts and losses in Iowa, during 1871, of the fire insurance companies of other States and countries doing the largest business there:—

	Premiums received.	Losses paid.
Ætna.....	\$118,681 68	\$58,914 34
Andes.....	58,249 45	13,852 90
Continental.....	52,634 50	26,732 18
Hartford.....	89,296 88	31,954 26
Home, of New York.....	77,190 81	16,359 78
Imperial.....	38,973 28	12,708 05
Insurance Company of North America.....	51,026 92	24,961 44
Liverpool and London and Globe.....	24,159 95	15,298 62
Phoenix, of Connecticut.....	68,868 29	28,772 84

Iowa has one life company—the Equitable, of Des Moines—the business of which is confined to the State. It is estimated that there are 40,000 life policies in force in the

State. Apart from seven non-reporting companies, the following is an exhibit of the Iowa life business in 1871:—

	<i>No. policies issued.</i>	<i>Premiums received.</i>	<i>Losses paid.</i>
<i>Ætna</i>	20	\$23,485 76	\$3,700
<i>American</i>	5	632 24	none
<i>Berkshire</i>	20	2,473 84	2,000
<i>Brooklyn</i>	33	1,621 31	none
<i>Charter Oak</i>	321	61,428 05	7,000
<i>Chicago</i>	90	2,848 38	none
<i>Continental, Conn</i>	50	6,111 52	none
<i>Continental, N.Y.</i>	373	69,451 29	8,000
<i>Covenant Mutual</i>	23	2,439 64	none
<i>Equitable, of Iowa</i>	254	38,813 00	6,000
<i>Equitable, of New York</i>	55	35,011 00	4,000
<i>Germania</i>	7	8,518 97	6,055
<i>Globe Mutual</i>	49	8,047 85	2,000
<i>Government Security</i>	4	172 70	none
<i>Guardian Mutual</i>	33	6,997 72	10,000
<i>Hartford</i>	8	322 49	none
<i>Home</i>	4	187 93	3,000
<i>John Hancock</i>	25	714 02	none
<i>Knickerbocker</i>	16	7,639 61	7,200
<i>Life Association of America</i>	12	8,462 06	none
<i>Manhattan</i>	8	1,988 30	3,000
<i>Missouri Mutual</i>	78	3,390 05	none
<i>Missouri Valley</i>	52	2,062 37	none
<i>Mutual, New York</i>	198	101,432 18	31,252
<i>Mutual, Illinois</i>	390	32,658 33	2,400
<i>Mutual Benefit</i>	112	no report	25,100
<i>National, D.C.</i>	143	6,024 80	.....
<i>National, Illinois</i>	893	4,033 20	1,000
<i>New England</i>	46	43,398 45	none
<i>North America</i>	59	8,131 86	none
<i>Northwestern</i>	343	209,863 56	23,513
<i>Pacific</i>	6	168 98	.....
<i>Phoenix</i>	100	16,518 69	8,150
<i>Protection</i>	32	476 00	none
<i>Security</i>	212	63,147 74	15,000
<i>St. Louis</i>.....	...	12,782 81	8,000
<i>Teutonia</i>	6	661 53	none
<i>Travelers</i>	281	5,485 95	1,000
<i>Union Central</i>	84	2,587 34	none
<i>Union Mutual</i>	130	29,918 73	6,000
<i>Universal</i>	4	2,260 28	1,000
<i>Washington</i>	280	51,084 32	14,500
Totals		\$906,951 74	\$198,625

—REINSURANCE FUND OF FIRE COMPANIES.

In view of the events now discussed, it may be questioned whether the tests of solvency and responsibility now applied to fire companies are the correct ones. That they are reliable is completely disproved by the sad history now before us, not only of the recent conflagration, but of every other large conflagration that has visited our great cities. The rule of requiring a reserve equal to fifty per cent. of the premiums actually received on outstanding risks, which is now generally adopted as the test, is based on the presumption that on the average the policies existing at any time have half their terms expired, and therefore the premiums are half earned. It also presupposes that the judgment of the companies and agents in apportioning the premium to the hazard is absolutely correct and the measure perfect,—and that the risks of any company on hand at the time are sufficiently numerous and separated to afford a fair general average. With reference to a large portion of the companies, all these presumptions are unauthorized, and to the same degree unreliable. The rule, applied to the smaller companies especially, and to all companies in some degree, fails to give them sufficient strength to meet any

extraordinary or unusual calamity, and hence failure in such cases is too frequently the inevitable result.

A more just and safe rule would seem to require that all premiums should be pledged to the protection of the policy during its entire existence; as the risk is a unit, and the premium is equally so. There can be but one destruction of the insured property, and no part of the premium can be said to be earned until the hazard of that destruction is entirely past. The man who has a wager upon a future event, as a closely contested election, or a race, can hardly be more boastful as the goal is *approached*; it is only as it is successfully *reached* that the prize is won. It has been justly remarked, that the contract of insurance is but a "bet" in which the insurer wagers a hundred to one, more or less, that there will be no fire. The stockholder could with no propriety give up half "the stakes" at any point in the strife. If by escape of time the policy grew less in amount, like the gross expenses of a man's support for life, this might justify a surrender of a part of the security; but while the whole liability remains, the liability of paying for any loss which may happen during the term, the security should remain unimpaired. A creditor can hardly be asked with any justice to relinquish or reduce his security merely because pay-day is approaching. There is in reality no distinction in principle in this respect between fire and marine risks, where in the latter case the rule now contended for has been uniformly adopted, and with the happiest results. The sad marine catastrophe lately occurring, where thirty-three ships of the Arctic fleet were almost simultaneously destroyed without a cent's loss of insurance, is a remarkable fact attesting the virtue of the principle now invoked, especially when it is considered that almost that entire loss fell upon the few companies of the single city of New Bedford.

The whole subject is one which calls loudly for reform; to prevent, if possible, the sad results of failure now so inseparably consequent upon every great disaster insured against. Unless something of the kind can be done, insurance in a great measure becomes a mere mockery, a word without meaning, a delusion and a snare.—*Fourth Annual Report of Insurance of the State of Maine.*

[This argument, which doubtless seems to the Maine commissioner very conclusive, is based on a misunderstanding of the subject. The element of time which enters into the calculation of premium is, in consequence, part of the calculation of premium reserve. In the commissioner's conjecture the whole liability is confounded with amount at risk, and the whole argument is another way of saying that the premium should be the same whether the duration of hazard is longer or shorter. If "escape of time" is of no account, then we have all sorts of reinsurance "solvency" set against like liability. Thus, \$1,000 underwritten at one per cent. for one year gives a ten dollar premium. At the end of six months a like hazard is insured for six months on a "short-rate" scale for, say sixty cents. Now here are two equal risks concurrent in time and equal in duration, yet for one the reinsurance reserve is ten dollars, and for the other six dollars.

As time makes premium, so time past earns premium. Reinsurance reserve is not designed as a supplementary provision to make up deficits from errors in rating, but is the simple measure of current liability by the terms of the contract; to depart from the terms of the contract is to vitiate the principle. To set up the reinsurance reserve *per se* as the measure of all the future possibility of fire danger, is to burlesque the fire insurance economy. As premium it represents certain assumptions, but no part can be properly charged with the responsibility of its whole. To hold the premium strictly to but its actual debits to the reinsurance reserve, to allow credits, to compel rigidly deductions for time past, is to make the premium or reinsurance reserve operate as a corrective of errors in the original premium basis. An expedient which tries to construct a security out of the premium which is *not in it*, is worse than futile; it serves to uphold false rating and undermines the security at its foundation.

"There is in reality no distinction in principle in this respect between fire and marine risks."

From this we ought to infer that "during the voyage" is marked in Maine by calendar periods; but waiving this, we will say that if there is no distinction in principle, there is a huge distinction in *fact*. The average unexpired duration of the collective, undetermined marine risks, is, as a rule, of comparatively brief period; and in view of this, and from other complications, it is a great convenience to lump the whole premium into the reserve—a practical short-cut out of an intricacy which avoids all measurement of current liability and is anything but an exemplar for other departments of insurance.]

—SPECULATIVE operations in life insurance still find favor with English capitalists. The Positive Government Security Life, which started with a proposed capital of \$2,500,000, has secured a subscription of \$400,000; and at a late meeting it was resolved, after closing the list for the first emission of \$500,000 capital, not to issue further stock at less than 25 per cent. premium. As a connection of the British Imperial Insurance Corporation (limited) the British National Insurance Corporation (limited) is projected, a fire and guarantee office with certain features in its plan to supply deficiencies in present fire insurance practice. Allowance will be made in every case for special precautions against risk on the part of the insured—with a bonus on renewal premium where no fire has occurred on the premises the previous year. Capital \$5,000,000; first issue \$2,500,000.

—To free the fire business from the control of the brokers the underwriters again resolve, but not with the requisite unanimity; still local boards and prominent companies, with confidence in their strength, essay the trial. The Chicago board recognising that either the board or the brokers must go down, will pay commission—i. e., such terms as the members may adopt, only to their duly registered employees in the exclusive service of their employers. "Such employees not permitted to place business, except such business be placed through their employees." In other quarters, compromise arrangements have been made.

—"URLYN." Who is Uriyn? We confess to some curiosity as to who is the correspondent of the Insurance Times writing over the nom de plume of Uriyn. The ability evinced by this writer commands respect and deserves acknowledgement. He displays a grasp on his subject, and a range of thought not often met with in the insurance press, and is in excellent contrast with the shallow trivialities with which we are surfeited. With more writers like this one, there would be less necessity for the insurance press to attempt to supply the absence of brains and rhetoric with vulgarity and scandal.

—By the new Ohio insurance law any medical examiner making a false report in respect to health or bodily condition of any applicant for insurance, shall be deemed guilty of a misdemeanor, and on conviction be fined in any sum not exceeding five hundred dollars, or be imprisoned in the county jail not exceeding three months, at the discretion of the court, and shall, moreover, be liable to the company injured for any damages sustained by reason thereof.

This will probably end in long discussions on the difference between diagnostic errors and deliberate falsifications.

—LIFE insurance as a basis of mercantile credit is the subject of a well considered and timely circular to business men from the pen of John F. Collins, Esq., secretary of the Republic Life. The argument of the credit value of a life

policy to the debtor, and its especial applicability to the protection of the capital of firms from deaths in the partnership, is enforced by apt illustration.

—FORESTS burn, village after village becomes ashes and ruin, the world is fire-lit all over. Both hemispheres and all continents share in the destruction. Yeddo, the capital city of Japan, the most vigilantly fire-guarded city of the globe, has had six square miles of flame. Had the fire swept a more compact portion of the city, the awful story of 1808 might have been repeated in full.

—THE following are late offerings of Hartford life companies' stocks, figures at per centage of par:—

	Bid.	Asked.	Sales.
Atlas.....	230	300	...
Travelers.....	119	123	122
Hartford Life and Annuity....	70	...	...
Continental.....	160	170	...
Connecticut General.....	93	96	...

—CANADA makes for 1871 a show of life business as follows, in contrast with the two preceding years, viz:—

	1869.	1870.	1871.
Premiums rec'd.....	\$1,314,324	\$1,441,563	\$1,741,793
Policies issued.....	6,308	7,205	7,111
Pol. become claims	146	160	184
Amount of same.....	306,125	416,529	380,330

—HON. WILLIAM BARNES resigns his position as consulting counsel and actuary of the Life Association of America. Mr. Barnes being complicated in the Miller prosecution, and all the bitter and fierce antagonisms which it involves, the executive committee of the Association deemed that the interests of the company would be best subserved by such resignation.

—SOMERSET, Pa., was Chicagoed May 9th. Fortunately for the underwriters, Somerset would not pay premium for insurance. Loss \$700,000, insurance \$100,000. Next time Somerset burns, the insurance men will not be so lucky. Began in a stable, wind high, swept six squares—about one-third of the place.

—AN act which was passed at the last session of the New York legislature, and approved by the governor, authorizes State corporations to hold such real estate in other States as may be necessary for the transaction of their business in those States.

—AT a joint-meeting of the directors of the "Andes," "Triumph," and "Amazon," Mr. David Comingore was unanimously elected treasurer of the three companies.

—THE Republic Life Insurance Company of Chicago has returned to its reconstructed building, a fine edifice of stone and iron.

—ANOTHER New York life company withdraws from the business, reinsuring its risks with the Hope Mutual Life.

—THE Triumph of Cincinnati has transferred its Philadelphia agency from T. J. Lancaster to Messrs. Kremer & Elmes.

—THE fire insurance prospect of Philadelphia city business for 1872 is premiums \$2,500,000, losses \$3,000,000.

RAILWAYS AND TRANSPORTATION.

WHILE the greater part of the inland carrying trade is being performed by railroads, and their development occupies the principal attention of parties engaged in that business, canals do not seem to be entirely forgotten. Ever since the commencement of the Suez canal we have been assured by eminent engineers (chiefly English) that it would be a failure. It has been suggested that these prophecies were not entirely disinterested, that under them lurked a desire on the part of the prophets to get a controlling interest in the stock of this "failure." Be this as it may, they have come to grief. The canal is not a failure. The report of M. Lesseps, the engineer, has lately been made, and from it appear the following facts: All the works on the canal proper have been finished, and the station or halting place of the Tishma lake has now been completed. This gives the company an internal port for ships to halt in, &c., of about fifty acres superficies and twenty-six feet two inches deep. The bed of the canal for one hundred miles from Port Said to Suez has everywhere reached the depth of twenty-seven feet two inches. Estimating from the experience of the past two years the annual maintenance of the canal proper will cost 825,000 francs. For facing certain of the banks with stone and sundry repairs to the dykes and breakwaters at Suez, 56,400 francs; for the renewal of beacons and mooring posts, 27,600 francs. The facing of stone will be completed in a few years, and then that item will be no longer needed. Vessels of upwards of two thousand tons burthen have passed through the canal at an average speed of about eight miles per hour, and all apprehension of delay from any cause is entirely dissipated. The largest merchant vessels are now freighted to pass through the canal to Asia and the East Indies. A large fleet of new iron steamers are now building in England for this route. A company has been formed in order to join Denmark to China by the canal. The Austrian government has established a regular line between Trieste and India. Italy is going to increase the steam lines between Genoa and India, and also increase the general Italian traffic in the Indian seas. The Russian line between Odessa and the far East will definitely resume its voyages; and Spain is in constant communication with the Philippine islands, through this artery, by a mercantile fleet carrying the Spanish flag. In view of these facts, the canal cannot certainly be called a failure, and there is no doubt that the success of M. Lesseps has lately stimulated the old project of cutting a canal across the Isthmus of Darien, and the prospects now are that it will be accomplished. The inter-oceanic canal project has received a sudden impetus, and a delegation of Georgians was lately in Washington urging upon the president and congress the absolute necessity and feasibility of the route and giving reasons why congress should lend it a helping hand. This is a scheme of uniting the waters of the Ohio and Mississippi to the Atlantic ocean by the following route: from the mouth of the Tennessee river, up that stream to Guntersville, Ala.; here a narrow neck of land separates the Tennessee from the Coosa, a distance of about thirty miles; from thence up the Coosa to Rome, Ga., and at this point there is no difficulty in constructing a canal across to the Ocmulgee river, and this will open navigation to the Atlantic ocean. The route has been ascertained by recent surveys to be eminently practicable and not very

expensive, the estimated cost being less than twenty millions. The real intention in this project, of course, is to benefit the strip of country lying between the mouth of the Tennessee and Ocmulgee: as merely to reach the Atlantic, it would be much cheaper to use the present outlet, or cut a canal through to Lake Ponchartrain.

—THE Pennsylvania Central railroad having achieved its purpose of connecting its southern leased lines with itself and its northern and western connections, by the Baltimore and Potomac railway, is now, according to the Baltimore papers, engaged in multiplying those connections by, among other things, endeavoring to infuse a little vigor into the movements now making for the construction of the Virginia Valley railroad. At latest advices this road was to be built, two contractors having already commenced operations on the section between Harrisburg and Staunton, and that this whole section will be under contract within sixty days. The engineers, it is said, have discovered a line by which the road can enter Lexington at the required grade—seventy-five feet to the mile; and if this is so, the main difficulty in the construction of the road to Salem vanishes. The Shenandoah railroad will make Staunton one of its points, thence on the line of the Chesapeake and Ohio road westerly to Covington, thence through south-west Virginia to the Tennessee line. This will give the Pennsylvania company one connection with its southern lines, notwithstanding Gen. Mahone. In addition to this, it is said that the Pennsylvania railroad will probably construct a road from Penningtonville (forty-seven miles west of Philadelphia) south-west, crossing the Susquehanna at Peach Bottom, to a junction with the Northern Central railway at Monkton, twenty-three miles north of Baltimore. This would form a route from Philadelphia to Baltimore, only about fifteen miles longer than the present line, which would be entirely controlled by the Pennsylvania Central. The length of the proposed road to be built will be about sixty miles, and in view of the fact that the Pennsylvania Central controls quite a net-work of southern lines converging at Baltimore, it would seem that there will be plenty of business for the new road. In this connection, however, it is proper to observe that the Pennsylvania road is rumored to be making renewed efforts to lease the Philadelphia and Baltimore road, and the fact that the former company has received permission from the city authorities of Philadelphia to lay a double track on Delaware avenue, and so to possess ample facilities for trans-shipping freight to steamers lying at the wharves, and that the company is making preparations to immediately avail itself of the privilege, would indicate that the managers were expecting a large southern business at no very distant day, and if so, one line between Philadelphia and Baltimore will not be enough.

—THE Camden and Atlantic Railroad Company have reason to congratulate themselves upon the result of last year's business. The length of the road is fifty-nine miles. Gross receipts of the road for 1871, \$364,500—a little more than \$6000 per mile; operating expenses, \$184,120—about fifty-one per cent.; surplus, \$180,379. Of this excess \$78,789 went for interest on the bonded debt, \$49,265 to renewal for May's Landing road, \$38,893 to increase of rolling stock, and \$16,326 to construction, insurance, taxes, &c. There were 29,797 more miles run, and \$30,056 more income received in 1871 than the previous year. The company has purchased the Cooper's Point and Philadelphia Ferry Company's stock, boats and property of every character for \$32,800, preferred stock at par, and propose to run the ferry under the charter of the railroad company. The May's Landing branch road, about seven miles long, it is expected, will be ready for use early in the coming summer. The branch from Atco to Williamstown, about ten miles long, is in course of construction, and will soon be completed. Another short branch, from White Horse to Blackwoodtown, about four miles, is under contemplation. These branch roads, together with the connection already formed with the Vineland road at Winslow, are tributaries that must eventually materially increase the business of the road. The capital of the company is \$1,180,700, and the funded debt in first and second mortgage bonds, \$390,000. The president, in concluding his report, said: "There were sufficient receipts during the

year, after deducting running expenses, interest, insurance, and taxes, to have paid a dividend of about nine per cent on the entire stock. The balance, however, was appropriated to renewals, construction, and additions to the rolling stock. As these are permanent, they will not have to be renewed this coming year, and the stockholders have reasonable grounds for the expectation of receiving a dividend."

—THE report of the comptroller of New Jersey, lately made public, shows the condition of its railways to be exceptionably sound and healthy. The total cost of the United Companies, their branches, and equipment, up to the close of 1871, is \$37,276,371. This includes the total property of the companies, embracing investment in auxiliary works, \$3,328,170.00 cash on hand, &c. Their receipts were: from passengers, \$3,780,434; freights, \$2,805,229; mails, \$41,916; miscellaneous, 72,638; canal tolls, towing, rents, &c., \$1,863,458; total, \$7,563,678. The operating expenses foot up \$4,944,700; other expenses, interest, taxes, &c., \$1,548,212, leaving a surplus of \$1,070,766. These receipts do not include \$129,206.32, paid by the Philadelphia and Trenton company out of earnings of 1871 to equalize dividends; nor \$150,000 from dividends of auxiliaries for the same time. Apparent expenses are also increased by payment of about \$300,000 for those of 1870, while the whole of 1871 are included.

The aggregate capital stock of all New Jersey roads is \$66,804,544; funded debt, \$46,877,760; other debts, \$5,926,379; cost of roads, \$87,822,845. Their total earnings were \$18,485,851; operating expenses, \$12,256,267, leaving a net surplus of \$6,179,584. Only a few of the roads failed to pay a dividend, and among those paying, the average was about six and a half per cent., the lowest four, and the highest ten per cent. To those who only think of the size of the State and limited internal resources, this seems an extraordinary exhibit; but it must be remembered that its location more than compensates for the want of these.

—THE auditor-general's railroad report, showing the operations of the Pennsylvania railroads for the year 1871 is at hand. It is merely the reports of the different railroad, canal, and telegraph companies, arranged in alphabetical order, without comment or recommendation, containing, however, much valuable information. There are 3,908 $\frac{1}{2}$ miles of main line laid within the limits of the State, the cost of which and equipments we estimate from data given at \$300,000,000, in round numbers. These roads report having carried during the year on the main line 3,152,309 through passengers, 31,548,996 passengers of all classes, and a gross tonnage of 58,807,802, at 2000 lbs. to the ton, 16,875,294 tons of which was through freight on the main line. The gross amount received from all sources was \$117,900,281.01, and the gross amount expended for maintaining the roads and real estate of the corporations, repairs of machinery, and operating the roads, was \$78,212,372.42, about sixty-one per cent.—leaving \$44,687,908.59, about twenty-nine per cent. profit. The rate per cent. of dividends paid by the different companies ranges from nothing up to twelve, and the rate of interest on their bonds is from six to eight per cent.

—THE following is a condensation from the report of the New York and New Haven railroad for the year ending Sept. 30, 1871: Length of main line, sixty-two miles, extending from New Haven to Williams bridge, on the Harlem railroad, by which latter road it enters New York: income, \$2,358,926.88; total expenditures, \$1,500,261.26; balance, \$848,665.62. There were received in addition for a new issue of stock, \$750,000, and expended, for permanent improvements (real estate, new iron bridges, steel rails, &c.), \$1,364,098. Two five per cent. dividends were paid on the stock. The consolidation of this company with the Hartford and New Haven, under the name of the New York New Haven, and Hartford Railroad Company, has been authorized by law, and an agreement to that effect will soon be submitted to the stockholders. The Shore Line railroad, leased by this company, seems to have earned just about enough to pay rent and running expenses.

—THERE is a prospect of a new through route from New York to Montreal. The combination for this purpose embraces the New York and Boston, the Duchess and Columbia, the Harlem extension, and the Vermont Central, and will be known as the New York, Boston, and Montreal Railway Company. The only unfinished part of the route is the New York and Boston road, and this is nearly all graded, and the rails will probably be laid during the coming summer. The new company labors under the usual difficulty of obtaining an entrance into the city of New York, but is stated to have made arrangements with one of the proposed underground quick transportation companies to use its road, if it gets a suitable charter, which arrangement seems to us rather a visionary foundation for a first-class road. The line will also connect at Montreal with the Grand Trunk and the projected Northern Pacific road. Indeed, Montreal and the Grand Trunk both seem to be making energetic efforts to connect by shorter routes with New York and the Atlantic seaboard. The Portland and Ogdensburg road is being pushed rapidly forward, and there is to be a branch constructed from Swanton to Montreal. The St. Lawrence is to be bridged at Ogdensburg, the surveys having been already completed, and this gives the Ogdensburg branch a connection with the Grand Trunk.

—THE Texas and Pacific railway has finally emerged from the apparent state of stagnation in which it has been involved, and under the new regime and the late beneficial legislation of congress, will at once be placed under construction. President Scott has signalized his accession to the leadership by the appointment of Gen. G. M. Dodge, formerly the chief engineer of the Union Pacific, to the position of chief engineer of this road. Gen. Dodge left Washington with his assistants the latter part of April, for Texas, to take preliminary steps to organize the work. A full working force will be on the line early in the fall, and it is expected 200 or 300 miles will be completed by next spring. It is the intention to prosecute the work from four different points.

—THE building of new, and the extension of old, railroads continues with unabated speed. We have only space to chronicle one or two. The Mississippi Central and the Mobile and Ohio railroads are to be extended to Cairo immediately, and it is said the former will be aided by the Illinois Central. The Oil Producers' road, to be constructed from Titusville and intersect the Buffalo and Jamestown road at the State line, has been located, and contractors will soon be at work; and the New York and Canada road, to be constructed on the New York side of Lake Champlain, from Whitehall to Rouse's Point. This company has been recently organized, which, as the plan is an old one, evidently means an early construction of the road.

—THE Panama railroad report shows earnings for fifteen months, ending March 31, 1873, \$421,223.89, out of which there has been paid one dividend and another payable April 8th of five per cent. The company show a cash balance of \$393,023, and in addition own real estate, steamers, tugs, &c., amounting to \$973,000, and about 300,000 acres of land on the isthmus of an uncertain value.

—THE legislature of New Jersey, at its late session, passed an act permitting the consolidating in one corporation of the Camden and Amboy and New Jersey railroads, and the Delaware and Raritan canal, and the directors of those corporations, at a late meeting, decided to accept the privilege, and consolidated the companies. We are not informed as to the name of the new corporation.

—THE Northern Pacific railroad sold bonds to the amount of \$1,891,900 during the months of March and April; and when we consider that the Alabama treaty has, during that time, almost entirely closed the European market for them, this argues that the popular confidence in them remains undiminished.

—THE Southern Railway Security Company has elected Mr. H. B. Plant president of the consolidated lines of railway from Bristol, on the Virginia border, to Memphis, on the Mississippi. Mr. Plant is a member of the company and president of the Southern Express Company, and from long experience, is probably the most capable man for the place available to the company. In June, in accordance with the contract, the Charleston road will be turned over to him as the representative of the lessees.

PATENTS, ARTS, AND SCIENCE.

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ECONOMICAL methods of producing oxygen gas have been the aim of chemical inventors for several years. The ordinary sources of this gas are either the binoxide of manganese, or chlorate of potassa, or what is more commonly used, a mixture of the two. But the expense of these materials has stood in the way of the economical manufacture of the gas on a large scale. M. Tessie Du Mothay, a few years ago, apparently succeeded in obtaining a supply of oxygen from atmospheric air, which he applied to the purpose of artificial illumination—not indeed by burning the oxygen, as some might suppose, but—by affording a stream of this gas to ordinary coal gas which had been carburetted by being passed through some volatile hydrocarbon liquid. In the application of his process to the purposes of artificial illumination, burners consisting of two concentric pipes are used, the inner one serving for the distribution of oxygen, while through the outermost pipe, ordinary street gas, carburetted, is conducted. At a small distance below the orifices from which these gases exude, there is a perforated vertical disk, the use of which is to prevent danger, as it is well known that a mixture of these two gases is highly explosive. Prior to the adoption of Du Mothay's light, cylinders of lime or zirconia were introduced into the flame of the oxy-hydrogen blowpipe—whence the name, the calcium light, or the zirconia light; the former being improperly conferred. The light introduced by Du Mothay, according to a description by Dr. Adolph Ott, of not merely one brilliant point, but of a steady flame of a slightly bluish-white, somewhat resembling that of the stars. But contrary to the effects produced by other artificial lights, the most delicate colors may be distinguished by this. In Paris the *Boulevard des Italiens* and the *Place de l'Opera* were lighted by Du Mothay's method, and many encomiums were passed upon the brilliancy of the light and its supposed success, but recent information states that it has been abandoned—having been found far more expensive than was supposed by its projectors, and it has been laid aside—perhaps only temporarily—until cheaper modes of administering it may be provided.

—THE burning of coal, especially anthracite, gives out mainly carbonic acid gas, which is commonly thought to be poisonous, but is really no more so than water. We may be smothered in the one just as we may be drowned in the other; in each case merely by the exclusion of air for breathing. But when fuel is burned with an insufficient access of air, carbonic oxide—which is semi-oxidized carbon—is formed instead. This is a virulently poisonous, asphyxiating gas. A small proportion of it in the air we breathe causes stupor; a larger quantity, death. It passes readily through red-hot iron, even when not hot enough to look red by daylight, and more slowly through iron of a somewhat lower temperature. In a close stove or furnace much of this gas is formed and, part escapes through the hot iron into the surrounding air. The bad effects of this have long been noticed, but were formerly attributed to the drying of the air, or to the burning of floating

organic particles. But dry air is invigorating, and the burning of even innocuous organic matter cannot produce unwholesome products, but rather the reverse—all charred organic matter being disinfected.

Free access of air through the stove door at once prevents the formation of carbonic oxide, or causes it to be burned into harmless carbonic acid, and then the stove may continue red-hot without injury to health. Carbonic acid, too, does not readily pass through hot iron: or the stove may remain closed without causing any ill effects, if cooled, until it will not appear red in the dark. The latter method is the most saving of fuel, but requires a larger stove or furnace to afford the same amount of heat; the heating surface having to be increased in proportion to the reduction of its temperature.

The open grate entirely prevents harm from this cause, and, when fuel is cheap, should be preferred for household use, not only for that reason and for its cheering glow, but also for the increased ventilation it produces, and because its heat is almost wholly radiated, like the health-giving rays of the sun itself. So, too, we conform more nearly to what our ancestors have been accustomed to in all ages, and suit the hereditary habits thus acquired.

—We recently alluded to the subject of boiler incrustations, a matter which is brought home to nearly all the users of steam power, by reason of the annoyances and direct loss caused by the formation of scale. Almost all natural waters contain enough lime, salts, and other impurities to create a crust on the interior of boilers, which, if neglected, may result in very serious consequences. Frequently these accumulations collect in such quantity as to seriously impair the efficiency of the boiler, and as the crust—whether composed of carbonate or sulphate of lime, or a mixture of the two—is a non-conductor of heat, its formation involves a loss of fuel, corresponding to the thickness which the deposit may have assumed. Various remedies have been proposed to obviate this trouble: substances which act either chemically or mechanically have been used, and in a majority of instances, after having been fully tested, have been set aside as worthless. Our attention has been called to the patent *Anti-Lamina* of Mr. Josiah J. Allen, of Philadelphia which has been used for several years with great success. We have taken some trouble to inquire into the record of this remedy, and we are pleased to state that our impressions of its merits are most favorable. Its cheapness puts it within the reach of all who need its benefits, while its character insures its perfect harmlessness. Its action is purely mechanical, and while—from the testimony of many who have used it—its efficacy cannot be doubted, it may be tried with a comparatively trifling outlay. From our knowledge of its composition, we can state that it cannot exert any corrosive or other injurious effect on boilers, which so many other patented remedies have been proved to involve.

—ORDINARY thermometers, especially those of cheap construction, frequently give very variable results when compared with the indications of other instruments of the same class. This is not always due to any imperfection in the thermometer itself, but sometimes to the casing, and often to the manner in which it is placed, being subjected to radiation from other bodies. Signal officer, Singleton, of St. Louis, who has had a very large experience in meteorological investigations, makes the following suggestions: "A thermometer should be placed in an open space, out of the vicinity of high buildings, or any object that impedes a free circulation of air. It should face the north, should be always in the shade, should be twelve inches from every neighboring object, should be fifteen inches from the ground, and should be protected against its own radiation to the sky, and against the light reflected from neighboring objects, or the ground itself. The thermometer should be read as quickly as possible, as the heat from the body or the breath influences the instrument. I have taken a thermometer belonging to a gentleman in this city, that read seven degrees above the standard instrument in this office, and after removing the back, which was of metal, painted black and varnished, (with a radiating power of seventy-seven degrees at night), placed it in my instrument shelter, after ascer-

taining the error by my standard (which was three-tenths of a degree, the instrument being an imported article and very fine), and found it to read exactly with the standard. Out of 470 observations at all hours of the day and night it varied but once, and then only two-tenths of a degree.

—CARBOLIC acid has occupied the minds of physicians and health boards ever since its properties were known. As a disinfectant and preventive of contagion its effects are widely acknowledged, and yet many observers prefer other remedies. Its poisonous properties when taken into the system are generally known, but only recently has it been accused of having produced poisonous effects by absorption when used as a dressing for amputations or other wounds. Dr. Mary C. Putnam, of New York, has recently called attention to this subject in an address before the Medical Library and Journal Association. In her remarks she referred to her experience in the hospitals of Paris, where she spent several years, and where she observed many examples which proved its use to be injurious rather than in its favor. In these wounds carbolic acid dressings are commonly used to prevent the absorption of putrid matter into the circulation, but this treatment has often resulted unsatisfactorily. Dr. Labbe's paper, giving his experience in English hospitals, is cited to prove her views, in which, notwithstanding all his care, all his amputated patients, to whom carbolic acid dressings had been applied, had died. Dr. Putnam further remarks: "This lugubrious statement corresponds entirely with the facts I have had an opportunity of observing closely. For at least three years, the use of carbolic or phenic acid has been almost universal in the great surgical wards of the Paris hospitals; but the mortality has not been notably modified, and remains higher than that of London."

—BUT few articles of common use, which admit of easy adulteration, are free from the addition of some cheaper substance. The records of the internal revenue department of England show that tobacco and beer are the subjects of very extensive sophistication. During the year 1870, four hundred and thirty-two samples of tobacco were examined of which three hundred and twelve were heavily dosed with adulterating materials. Wheat and rice flour, starch, sugar, licorice, lampblack, and various coloring-matters were chiefly used. As regards sugar, molasses, or licorice, these can hardly be called adulterants, as they are largely used in preparing plug tobacco to impart the sweetness and flavor which is relished by some devotees of the weed. The examination of beers and ale, made by the same authority, showed that sixty-five per cent. of the samples were adulterated, and with rice-flour, licorice-powder, sugar, molasses, grains of paradise, and tobacco: this last material, however, was found in only one sample.

Apropos of this subject, the Chinese have begun to evince their claims to civilization by employing adulterating materials in tea. About ten years ago the cultivation of the willow was started, solely for the purpose of mixing its leaves with the genuine tea-leaves, a practice which has grown to an enormous extent. According to a recent authority, in 1871, no less than 440,000 pounds of willow-leaves were thus used. By some of the "cheap" tea companies in our larger cities, bran is extensively employed as an adulterant of tea.

—COAL-TAR, which has furnished such a host of products of different properties and uses, has lately contributed a new remedy, which is said to be efficacious in the treatment of small-pox. Xylol, which is the name of the new specific, is homologous with benzole and toluole, and has a specific gravity of 0.8309. It was discovered by Cahours in 1850, among the products of the destructive distillation of wood. It is obtained from crude pyroxylic spirit by the addition of water, which causes it to separate, and it is then agitated with sulphuric acid. After several hours standing, a mixture consisting of xylol and other hydrocarbons is found floating over a brown liquid. This is first washed with a solution of hydrate of potash, afterwards with water, dried over chloride of calcium and anhydrous phosphoric acid, and afterwards submitted to distillation. Xylol is found in the liquid which comes over at 120° to 130° C. As a specific for small-pox, it is best

administered in the form of an emulsion with cinnamon syrup, or in gelatine capsules, in doses of ten to fifteen drops, repeated as frequently as the necessities of the case demand. This remedy has been used by Dr. Zuelzer, in Berlin, with great success. His experience leads him to assert that the good effects of xylol are only observed when it is perfectly pure, and entirely uncontaminated with tulole and benzoll.

—THE actual weight and cost of the paper which has been used in preparing government obligations is thus reported by the secretary of the treasury:—

	Pounds.	Cost.
National bank notes.....	100,858	\$ 78,669 24
Greenbacks.....	206,639	175,844 45
Fractional currency.....	319,176	243,406 94
Bonds.....	110,873	91,887 63
Internal revenue stamps.....	78,063	36,689 14
Total.....	812,608	\$625,494 40

But besides this, there is a reserve of paper to be manufactured into greenbacks, fractional currency, bonds, and revenue stamps, amounting to 257,183 pounds, costing \$204,812 86. From these figures it will be seen that the grand total amount of paper used, or to be used, in our paper money and other obligations, is 1,069,791 pounds, costing \$830,306.76. In other words, the enormous quantity of 585 tons of paper is required to print the evidences of governmental indebtedness.

—CANADOL is the name given by Dr. Vohl, of Cologne, to a peculiar petroleum found in Canada, and which he considers as especially valuable as a solvent of fats, and suggests its use to obtain oils and fats from their natural sources, rather than by cold or warm pressure. From his investigations regarding the applicability of this liquid the doctor has concluded that it is superior to bi-sulphide of carbon. Vegetable oils may be readily extracted, and on the evaporation of the solvent, it is said they are left in a greater state of purity than when other liquids are employed. Cacao butter may be readily extracted from the bean, and castor and other oils from the seeds. Even the fat from bones, from the ivory tusks of elephants, the narwhal and the walrus, may be removed without impairing in the slightest degree the texture of the remainder. Bi-sulphide of carbon, and the lighter hydrocarbons distilled from petroleum, are now largely used as solvents of fats. The canadol described by Dr. Vohl must be of an allied nature with the latter, although, perhaps possessing greater powers.

—RECENT experiments made by M. Deherian, seem to demonstrate the fact that, in the presence of organic matter, atmospheric nitrogen combines directly with oxygen, and is thus fitted to become food for plants, to which this element is so essential. Careful analyses of manured soils frequently show that they contain much less nitrogen than the crops grown on them; and although some chemists have long entertained the idea that plants possess the power of assimilating nitrogen from the atmosphere, no satisfactory rationale of the action could be given. *Les Mondes*, in alluding to the investigations of M. Deherian, says that the combination which ensues between these two gases, takes place in a manner somewhat analogous to the formation of ulmic or humic acid, produced by neutralizing an acid with the potassic solution of garden-mould. Oxygen, nitrogen, ammonia, and glucose were introduced into a perfectly dry tube, which was exposed to heat, whereupon a black nitrogenous matter was formed, while it was found that the quantity of nitrogen in the tube was much diminished.

—To produce wine from malted liquors has been attempted by various brewers and chemists, and some have claimed to be successful. At a brewery in northern Germany a red beer, or "malt wine," has been made, which is described as possessing a character between Rhine wine and Burgundy, with a port-wine flavor, very lively and agreeable; while in a glass its behavior is much like good wine, which it resembles by clinging to the glass and forming what the Germans call "church windows." But as this peculiar

characteristic may be imparted to any spirituous liquor by the addition of a few drops of glycerine, it is no evidence of genuineness. Large quantities of malt liquors are doctored in various ways in Spain, and are exported to this country and Europe as genuine sherry. It is an unpardonable misnomer to call any liquor *wine* unless it is made exclusively from the juice of the grape; and no matter how palatable other liquors may be, they should not be denominated wines, as their chemical and other characteristics are widely different from those of genuine vinous liquors.

—AMONG labor saving appliances, one of the most ingenious and important effects of modern invention has been the perfecting of machines for manufacturing horse-shoes. According to the *Chronique de l'Industrie*, a very successful factory of this kind is that of Mansoy et Cie., who supply the omnibus and cab companies of Paris, and who, during the late siege furnished all the horse-shoes required by the cavalry. The machinery is described as being very simple—a rolling mill, a shaping machine, two steam hammers, and two punching machines, with, of course, dies for each size of shoes made. The entire cost of the machinery is said not to exceed six thousand dollars. The hammers require fifteen-horse power, and a six-horse engine suffices for the remainder. The product of the factory is two thousand shoes a day, with six laborers and three apprentices, and the space occupied by the factory is about four hundred square meters.

—JAVELLE-WATER is the name of a solution of bicarbonate of soda with some chloride of lime, which exerts a prompt effect in restoring old engravings, wood cuts, printed matter, and other articles, which have become brown or yellow by age. It is prepared by dissolving four pounds of bicarbonate of soda in one gallon of boiling water, and adding one pound of finely pulverized chloride of lime. When cool it may be bottled for use. The immersion of old and stained prints and other articles in this solution for only one minute will completely restore them to their former color, and no injury is done to the texture of the fabric—especially if washed in water containing a trifling quantity of hyposulphite of soda.

—THE observation has lately been made that in genuine grape wine the phosphoric acid is combined with magnesia, while in so-called wines, made from other fruit, it exists in combination with lime. It is said the difference between the two may be distinguished by the addition of ammonia in the proportion of one part to nine parts of the wine. After twelve hours' standing this will produce in genuine wine the well known precipitate of ammonio-phosphate of magnesia. We give this for what it may be worth, but should decidedly prefer corroborative testimony before accepting it as conclusive.

—AMONG the various theories accounting for the phenomena of the sun's existence, we must record that of Faye, the great French scientist, who, in consequence of the existence of ascending currents everywhere proceeding from the sun's centre to its surface, believes that instead of a liquid mass, the body of the sun must be in a gaseous state, and is an immense sphere of æriform matter of an enormous temperature, but which is constantly cooling by the action of the ascending currents; and further, that the sun is absolutely spherical.

—SLATE has been recently substituted for boxwood as a material for engravings. It is said to be easily cut, and that it wears as well as electrotypes; and furthermore, that the sharpness of outline is retained after a very large number of impressions have been struck off. Other advantages which slate possesses are that it is not affected by oil or water, and that with variations of temperature it never becomes strained or warped, which boxwood does. If further experiments confirm the views held by these who have tested it, a large demand will ensue for slate for this purpose.

—PROF. JAMES D. DANA, of Yale college, a mineralogist, whose works are recognized as the standard authority throughout the world, has recently been made the recipient of the Wollaston gold medal of the Geological Society of London—which is the highest honor the society can confer: it was awarded February 16th. At this meeting numerous addresses were delivered, all alluding to the distinguished services of Prof. Dana in his special branch of science.

—IN the year 1871, the twenty-five principal sewing-machine manufacturers of this country sold no less than 606,094 machines. Of this large number, the one manufacturing company, which sells more than any other concern, heads the list with a return of the sale of 181,360 machines.

INDUSTRIAL INTELLIGENCE.

—THE Kensington iron works, Philadelphia, of which A. L. Archambault is proprietor, were started in 1848, in Drinker's street, near Second and Race streets, for the building of stationary engines and general machinery. Mr. Archambault invented and built in 1849 the first portable engine mounted on wheels for hoisting cargoes from vessels, stone and timber for bridge building, and for hoisting iron ore, pumping, &c.; also built the first portable engine for driving thrashing machines, and which was used on the farm owned by Maj. John Jones, in Delaware, in the year 1849. The demand for this portable engine called for larger works, and such were located at Fifteenth and Hamilton streets, where Mr. A. remained several years. In 1863 the demand for tug boats was so great that Mr. Archambault commenced the building of the engine and boilers adapted to them. His reputation for this description of engine and boiler is unsurpassed in the United States; his tug boats now number ninety-four. There are several very powerful tugs at New York, fitted out at his works; amongst them are the R. S. Conover, Willie, Winnie, Harry, and Chief. Their cylinders are 30-inch bore and 30-inch stroke, and fitted up in the most approved style. The Kensington iron works, now located at Beach and Vienna, on the Delaware river, have capacity for 150 hands, and most ample dock room for vessels to lay while undergoing repairs or receiving their machinery. The buildings are—1st, a three-story brick 75x80, the ground floor of which is used for erecting shop; second floor as office, drawing room, and pattern shop; third story as pattern loft. 2d. A two-story building 30x100, the ground floor of which is used as machine shop; the second-story for heavy wood work, sawing, planing, &c. 3d. A one-story building 150x30, as blacksmith and boiler shop. On the pier is a permanent pair of shears, capable of hoisting out of or into a vessel a boiler of many tons weight. Railroad track extends from pier to inside of works, by which means a boiler of ten tons can be moved to end of pier in five minutes, where before it took over five hours. Mr. A. also builds first-class pleasure steam propeller yachts, from thirty feet long and upwards. The capacity of this establishment for building anything that floats is remarkable.

—EVERY manufacturing community is startled now and then by the explosion of some steam boiler, consequently the various steam generators receive the rigid criticism and close examination which the possible danger attending their employment calls for. At the present time Lady & Verner's improved patent safety boiler presents its claims as a safe, economical, and durable invention. It has, we believe, been in use eight years without a single instance of explosion.

The generator is simple in all its parts, in order to be accessible in case of cleaning or repairs; and the tubes, owing to their smallness of diameter, are capable of withstanding a great pressure, hence the danger of a serious or general explosion is obviated. It is generally conceded that boiler tubes are not explosive like the shells of boilers.

The steam generating surface consists of a series of wrought-iron lap-welded boiler tubes two inches in diameter, firmly expanded into wrought-iron sheets seven-eighths of an inch in thickness. The tubes are arranged so as to give a free upward flow or circulation to the entire body of water through the tubes to the steam drum, where, by means of a breakwater of peculiar construction, the steam is separated in a dry state, and the water returns by means of stand or side pipe, outside and away from fire surface, to the point of starting; this gives a perfect circulation to the water, whether combustion is slow or rapid, and keeps all parts of uniform temperature, and the interior of tubes free from scale and sediment, and in the best condition for absorbing the fire, (as the sixteenth of an inch

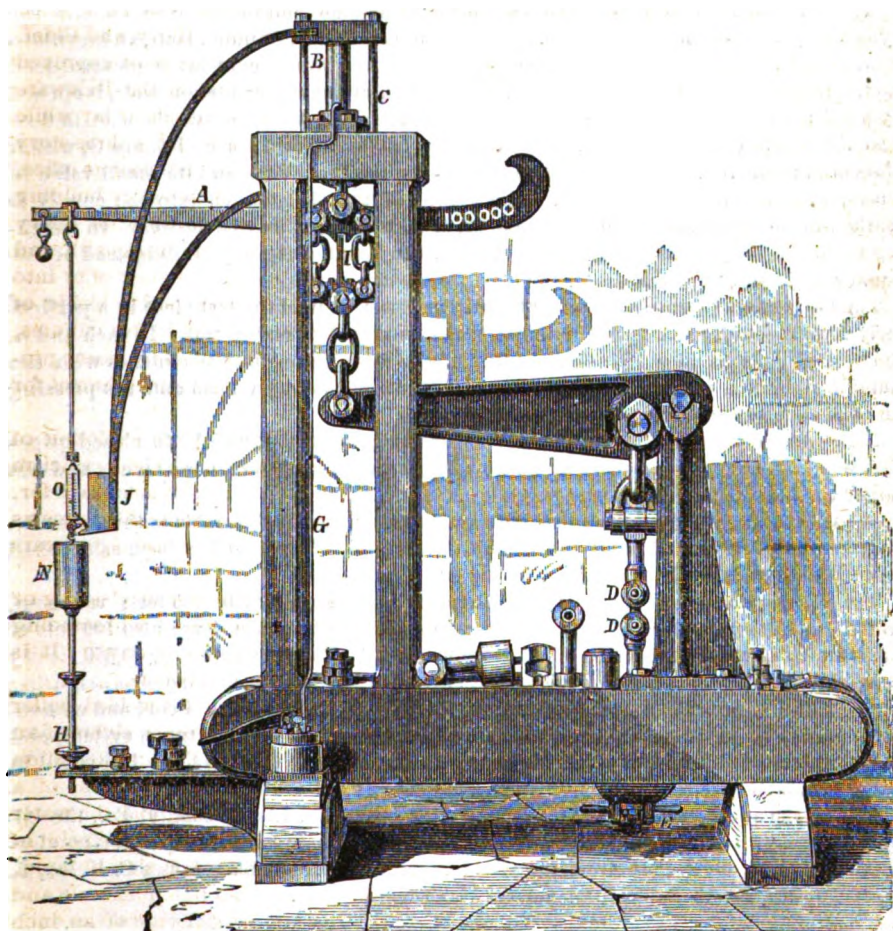
of incrustation causes a loss of about thirty per cent. of fuel.) There are no joints or connections exposed to the fire, or out of sight.

These boilers are rapid generators of steam, raising steam to start the engine in twenty minutes. By their simplicity of construction any blacksmith can repair them. They are built to conform to any length, width, height, or capacity, and are adapted to transportation in the lumber and mining districts.

The distribution of the tubes is such that all their outer surfaces are made available as heating surfaces, so that the ratio of heating surface per horse-power is greatly decreased; consequently generators of a large or small power can be erected with a comparatively small number of tubes.

The back-cap and tube-sheet (to which the rear ends of the tubes are connected) slide in and out on plates, as the tubes expand or contract, thus preventing leakage of the joints. The front ends of the tubes being rivetted to wrought iron sheets, are not subject to injury or leakage in expanding or contracting. Where parties prefer them, cast-iron grates, instead of water grates, can be put in.

—THE following cut represents the testing machine for ascertaining the strength of metals, manufactured by Riehlé Bros. It has a capacity of 100,000 pounds.



In connection with the machine are tools for applying all varieties of strains to test pieces of metal; and boiler plate also, all other materials, such as stone, &c. It can be modified so as to test iron and stone columns, and pillars, girders, bridge bolts, chain, wire, or rope, to any capacity.

It is balanced upon steel knife edges, and so nicely adjusted that a small weight placed in the weight-dish will affect the beam instantly.

Explanation of the Engraving.

The crane beam A is suspended from the hydraulic jack B, by a yoke C, and connected with this small end of the main lever by a clevis and fulcrum. The piece for testing is placed in the clutches at DD. All the bearing parts of the machine rest upon steel knife edges, and when ready for operating, the whole machine is in perfect equipoise, and so nicely adjusted that a half-ounce weight placed on the weight dish will turn the beam. Before the strain is applied, the slack is taken up by means of a screw and nut at E; the beam is then raised by the jack and pump. The pump is connected by the tube GG to the jack, and as the strain is applied, the beam is kept in the equilibrium by placing weights on the dish at H. The indicating finger I, vibrates freely in the slotted place in the crane beam. Now as the crane beam is placed between the small end of the main lever and the pulling jack, the strain is actually weighed by the beam, and not indicated by pressure in the hydraulic jack, as in most machines. In order to get a very accurate result, an ingenious self-feeding arrangement is applied, consisting of a reservoir J, containing mustard-seed shot, which is suspended from the jack B; a valve M, at the base of the reservoir, is opened by a pin attached to the beam rod, when the beam raises, which allows the shot to flow into the cup N on the beam rod. This cup N is suspended to a spring balance O, which is secured to the rod. When the test piece breaks, the beam falls, and the small valve M closes, stopping the flow of shot. The weight of the shot poured into the cup N is marked in such a manner as to indicate 5, 10, or 25 pounds, as may be desired. In weighing up to 100,000 pounds the operator is required to handle only 80 pounds instead of 800 pounds, as in some machines.

The two figures marked D represent a grip or vise, that hold the test piece in a particularly firm manner, causing a fair and square break, and a correct test. In each end of the test piece is bored a $1\frac{1}{8}$ inch hole, and the piece is placed in the clutches with the thimble tightened up by the bolt which passes through, having a head and nut pressing on each side, so as to prevent bending of any kind.

N.B.—In the place of the clutches adapted for the test pieces, will be furnished grips that will hold securely any piece of metal, whether in the shape of a bar or plate, and not larger than the usual size test pieces.

—ONE of the best conducted industrial establishments of Philadelphia is the Jefferson Belt Works of Messrs. Wm. F. Forepaugh, Jr., & Bros. The firm has been established since 1858 for the tanning of oak leather for belting purposes.

The main building is a substantial four-storied brick structure 202x55 feet; vat room, frame, 36x40, and contains 18 vats. They have 14 leaches 7x9 $\frac{1}{2}$ feet deep; also 100 vats of the same size, used as "handlers" and "layaways." Tanning capacity, 10,000 heavy steer hides per annum. From 8 to 12 months are occupied in the tanning process, using the best quality of barks for making their liquors, which are always used cold and without the addition of any chemicals. The establishment is a model of neatness, system, and completeness of detail, and will well repay a visit on the part of any one interested in such manufacture.

—At the annual meeting of the Emaus Iron Company, Lehigh county, Pa., the following officers and directors were elected: S. Gross Fry, president; John Weler, vice-president; J. P. McFadden secretary and treasurer; O. O. Bowman, James C. Kelch, J. P. McFadden, Moses Wleand and George H. Gorr, directors.

MONETARY.

SOME improvement in eastern bank reserves and increase of loanable capital have been features of the market for May; but the general situation cannot be pronounced easy. Politico-financial complications intervene to mar the otherwise quiet current, and hinder the absorption of great blocks of the numerous new securities ever multiplying and pressing for purchasers. The Washington treaty, supplemented by an article of the American senate waiving consequential damages, is regarded by the British ministry—now grown wary of American phraseology—as evasive. Disturbances in the London market react upon American finances. The Bank of England raising the rate of interest to 5 per cent. to attract gold, upon an apprehension of too great an outflow of gold for South American loans, has since decreased the rate to 4 per cent.

Congress will probably adjourn without enacting any disturbing financial measure.

As the month closes, there is shown an advancing tendency in foreign exchange, and a further strengthening of the gold premium. The exchange market is cleared of bills drawn against bonds, and very few commercial bills are offering. Government bonds are scarce, and their price is advanced to a point which prevents their shipment to Europe. Europe is not taking any new railroad bonds at the present time, so that the foreign bankers are looking to specie as the only means for covering their bills.

—Sales of Stocks, etc., at New York.

	May 6.	May 13.	May 20.	May 27.	June 3.
U. S. 6's, coupon, 1881.....	118½	118½	118½	119½	120½
“ 5-20's, coupon, 1862.....	118	118½	118½	118½	114½
“ 5-20's, coupon, 1864.....	118	118½	118½	119½	114½
“ 5-20's, coupon, 1865, m & n.....	118½	118½	118½	114½	115
“ 5-20's, coupon, 1865, j & jy.....	115½	115½	115½	116½	116½
“ 5-20's, coupon, 1867.....	115½	116½	116½	117½	117½
“ 5-20's, coupon, 1868.....	116	116	116½	117½	117½
“ 10-40's, coupon.....	110½	110½	111½	112½	112½
Pacific 6's, currency.....	116½	116½	116½	117½	117½
Tennessee 6's.....	70½	72½	72½	73½	*72½
“ 6's, new.....	71	72½	72½	73½	72½
North Carolina 6's.....	85	85	82	82	*30
“ 6's, new.....	20	20	20	20	20
Missouri 6's.....	96	95½	96½	96½	96½
N. Y. Central and Hudson R. con.....	96½	97½	98½	97½	97½
Harlem.....	123	126	127	124½	120½
Erie.....	65½	70	75½	68½	65½
“ preferred.....	87	87	87	87	84
Lake Shore and Michigan Southern.....	94	† 95½	95½	95½	96
Wabash.....	76½	76½	75½	75½	76
Cleveland & Pittsburgh.....	98	92½	90	91	90
Northwestern.....	75½	76½	76½	73½	75
“ preferred.....	98½	98½	94½	94	94
Rock Island.....	110	113	113	110½	111
Fort Wayne.....	96	96½	97½	97	96
Milwaukee and St. Paul.....	58½	60½	59½	57½	58
“ “ preferred.....	79	80	79	78	79
Ohio and Mississippi.....	48½	49	48½	47½	47½
New Jersey Central.....	109½	109½	108½	108½	109
Western Union Telegraph.....	74½	75½	76½	76½	76½

	May 6.	May 13.	May 20.	May 27.	June 3.
Pacific Mail.....	72½	80½	88½	78½	75½
Union Pacific.....	39½	39½	39½	40½	39½
Adams Express.....	99	99	100	98	97
Wells, Fargo & Co. Express.....	85½	85	....	95	87
American Merchants Union Ex.....	78½	....	75½	80	79
United States Express.....	77½	....	81	84½	84½
Rate for Money.....	6@7	6@7	5@7	5@7	5@7
<i>Sales of Stocks, etc., at Philadelphia.</i>					
Gold.....	113½	113½	118½	118½	114½
Lehigh Valley Railroad.....	59½	59½	59½	59½	59½
" " 6's.....	95½	98	98½	99	96½
" " 7's, reg.....	....	104½	104½	105	105½
Lehigh Navigation.....	45½	45	44	43½	43½
" " 6's, 1884.....	88	90½	....	90	91
" " 6's, g in.....	....	94	94½	95	96
" " 6's, R.....	....	93	93	94	93½
City 6's, no tax.....	101½	101½	101½	101½	99½
" tax.....	97	97	96½	98	96
Pennsylvania Railroad.....	*57½	57½	58	58	58½
" " allotments.....	57½	57½	....	....	....
" " 6's, 1m.....	101½	101½	101½	101	101
" " 6's, 2m.....	....	97½	97½	97	99½
Pennsylvania 6's, w ln.....	100	100½	100½	....	....
" " 6's, first ser.....	100½	102	102	102	102
" " 6's, second ser.....	....	105	105	....	105
" " 6's, third ser.....	....	107	....	....	107
" " 5's, cp.....	....	....	....	....	....
Reading Railroad.....	58½	59½	59½	60	60½
" " 6's, mt.....	....	94	95	96	96
" " 7's.....	....	....	103½	104½	....
Catawissa Railroad.....	18½	....	17½	17½	16
" " preferred.....	....	47½	45½	45½	45
New York and Middle.....	....	....	....	....	....
North Pennsylvania R. R.....	51	50	50½	50½	50½
" " 6's, mt.....	....	....	101	101½	102
" " 7's, mt.....	....	94½	95	95½	95
" " 10's, chat.....	....	109	110	110	110
Camden and Amboy R. R.....	126½	126½	126	126½	126½
" " 6's, mt, 1889.....	....	93½	93½	93½	94
" " 6's, 1883.....	....	....	92	91½	91½
" " 6's, 1889.....	....	92	91½	91	89½
West Jersey Railroad 6's.....	88½	93½	93	93½	95
" " 7's.....	....	102	102	102	102
Philadelphia and Erie.....	....	28½	28	28½	28½
" " 6's.....	89	88½	89½	....	89½
Allegheny County, 5 cp.....	....	78½	....	78	....
Schuylkill Navigation.....	....	....	7½	7½	7½
" " preferred.....	15½	15½	15½	15½	15½
" " 6's, 1882.....	....	....	79½	79½	79½
Morris Canal.....	48	48	49	49½	50
" " preferred.....	....	....	124	124½	125
" " 6's, 1882.....	....	92	93	94	93
Little Schuylkill Railroad.....	....	47½	47½	47½	....
Oil Ck. and Al. R.....	41	41	39½	38	38½
" " 7's.....	....	79	....	....	79
Phila., Ger., and Nor. R. R.....	87½	87½	86	86½	86½
Minehill Railroad.....	53½	53	53½	53½	54½
Elmira and Williamsport, preferred.....	40	40	42	....	42
" " 7's.....	91½	92	95	95	94
" " 5's.....	60	58	58	58	58
Northern Central.....	....	40	....	38½	38½
Fulton Coal.....	....	....	5	....	5½
Rate for Money.....	6@6½	6@6½	6	6	5@6

* Ex. dividend.

NOTING AND COMMENTING.

THERE have been no European events of great moment during the past month. Perhaps the most surprising instance of the difficulty of estimating aright the temper of another people is the result of Serrano's treatment of the Carlist insurgents. It begins to look as though the successful suppression of the rebellion had weakened rather than strengthened the position of the ministry. The downfall of the Sagasta ministry is asserted to have been caused by certain developments as to the use in the secret service department of some twenty millions of dollars. The results of the expenditure seem to be the inclusion in a common circle of suspicion of nearly every political leader in Spain; and it is even hinted that the king has been coquetting with Bismarck for Prussian assistance. The Serrano ministry is composed for the most part of unionists. Candare and Belaguer are the only progressionist members.

The Spanish Bank has determined upon the issue of fractional notes similar to those of our own country. They are to be printed in New York: the currency printed there for the Swiss government being so much in advance of the European engravers as to open for us a market in that direction. Mr. Sickles has arrived in Madrid, and was received on the 27th ult. The course of Sabalza, the new governor of Cuba, gives promise of something like an honest and efficient administration of the affairs of that unhappy city. The captain-general has again called the attention of the cortes to the financial condition of the dependency.

Most conspicuous of the late proceedings in the French assembly has been the remarkable speech of the duke D'Andiffret Pasquier, in which the condition of the French army during the late war was exposed with great clearness and power. Its effects threaten, in the present state of the public feeling, to be most unfortunate, since the real object of the effort was to reanimate the old French love of glory and excite a deeper feeling of revenge. The commission on capitulations has censured with considerable severity Gen. Ulrich for his capitulation of Strasburg, while it has absolved the officers commanding at the surrenders of Montmedy, Amiens, and Neubreisach, and recommended the commandant of Phalsburg for the

cross of the Legion of Honor, for his "brave and most obstinate" defence of that fortress. Upon the question of the capitulation of Paris the commission finds it impossible to arrive at any final decision beyond the censure of Jules Favre (upon whom the responsibility of the surrender is placed), and the exculpation of Gens. Vinoy and Trochu. The budget gives the estimates for 1873 at 2,425,000 francs for revenue, and 2,406,000 francs for expenditures. Marshal Bazaine continues to await in his country place, where he is held nominally as a prisoner, his court martial. The general negotiations with Prussia for the complete evacuation of French territory by German troops are reported as progressing favorably.

Mr. Gladstone has perhaps never passed a more trying, and in every way disagreeable, month than that just closed. The "unpleasantness" of the position of her Majesty's ministry was not decreased by the singular thirst for information in regard to the American treaty displayed by her Majesty's opposition. At the present writing it is impossible to say what has become of the treaty. The last amendment was supposed to have been accepted by the American senate, but turns out, according to the English view, not to have been; and the whole subject has become so complicated that its entire abandonment, although improbable, is perhaps far from impossible. Mr. Hughes gave the house of commons a quite novel sensation by opposing the time-honored adjournment of that body for the Derby day, and by attacking with unmeasured severity the English system of races and betting. The adjournment, however, was carried by 212 to 58, and the incident is chiefly remarkable to foreigners as an illustration of that decorum and dignity by which the English legislative bodies are distinguished. Mr. Hughes, whose opposition was not altogether idiotic, being received with ironical cheers, laughter, and the terrible coughing by which the house protects itself from hearing unpopular opinions, and only being heard at all because of his great persistence.

Count Bismarck's continued ill health, and consequent retirement—temporarily, of course—marks the course of German politics as uneventful. The most important measure of the

month is the resolution of the reichstag asking the government to submit the draft of a law regulating the grant of licenses to religious orders, and providing for the punishment of those of their members who are guilty of dangerous activity towards the State; or, in other words, who carry their belief in papal infallibility into everyday life.

The archduchess Sophia, the mother of Francis Joseph, of Austria, and one of the most remarkable women of her time, died May 26th. Her indomitable will and singular knowledge of human nature enabled her to leave her mark very deeply engraved upon the Austrian nation. For many years the emperor was almost entirely under her control, and her influence in all affairs of State continued to the end.

By an imperial decree the emperor of Japan has abolished all edicts directed against christianity. The reported attempt to assassinate the emperor seems to have been nothing more than the ill-advised attempt of a number of Buddhist priests to force their way into the imperial palace, in order to protest against the decree and insist upon its withdrawal. Five of their number were cut to pieces, and the rest fled. It is not believed that any serious complications will arise from this bold position of the emperor in relation to what has been for so long a most difficult question of Japanese government.

—THE second meeting of the centennial commission was distinguished at once for its enthusiasm and the sign it gave of capacity for real work. The administrative abilities of Americans are precisely those most generally recognized abroad, and for that reason a great deal will be expected of us by the world. We cannot afford to rest content with doing as well as our friends in Europe; we must do vastly better things. Fortunately, the commission promises to represent the nation, and to look at the commemoration as what it really is—not an affair for one city or State, but peculiarly and in every sense the affair of every city and every State in the Union. As this will be the field of the Cloth of Gold of our generation, it is suggested that the area covered by the direct programme of the commemoration shall be a circle having a radius of one hundred miles from Independence Hall as the centre.

—WE have news from Germany that a congress, international in character, will be summoned at Berlin, for the purpose of fixing upon some uniform postal arrangement for the whole civilized world. The rate spoken of now is two pence per half-ounce for letters, with one penny per two ounces for newspapers; but this is thought to be too high a rate to work upon—certainly for internal postage, being double the established rate in England. The established rates of postage in America, Great Britain, and on the continent of Europe, are just now in too unsettled a condition to let us hope for an international arrangement; and yet the subject

is one of great interest to all the commercial powers, and a preliminary congress might at least be looked upon as opening the way to a solution of the question.

—THE Sioux delegation of Indians now in Washington held a council at the Interior department a few days ago, at which all the delegation were present, and the United States were represented by Secretary Delano and Commissioner Walker. The chiefs and warrior were all arrayed in their most elaborate savage costumes. The council opened by Commissioner Walker making a brief speech, announcing his pleasure at meeting them, and at the knowledge that they continued friendly to the government and whites. Red Cloud, Red Dog, and two other principal chiefs made speeches, the burden of which was an earnest desire on their part to preserve the present peaceable relations with white men. They also spoke of the reservation selected for them, and which does not accord with their wishes.

—THE most influential journals published in Vienna are owned by banks and devoted to their interests. An Austrian bank does not confine its business to strictly banking operations, but its undertakings are of the most manifold kind in all branches of industry and commerce; so the control of a widely-circulated newspaper is of great assistance to the projects of such an institution. The *Neue Freie Presse*, which has by far the largest circulation of any Vienna daily, is owned by the Union bank. The *Presse*, having the next largest circulation, is owned by the Bank Verein; the *Fremdenblatt*, the so-called organ of the Vienna aristocracy, by the Credit Austalt, also a bank; while the *Wechsler* bank runs two daily papers.

—THE recent amendment to the Homestead act, under which the veterans of our late Federal army and navy can secure free homesteads of 160 acres near the lines of the great land-grant railroads, by one or two years residence, instead of five, is very naturally attracting much attention among the soldiers and sailors. Colonies are forming in many parts of the country for the purpose of taking advantage of the new law, while at the same time reaping all the advantages of moving West in organized communities.

—IOWA has abolished the death penalty by a short and sweeping act of the legislature. The death penalty as a punishment for crime is abolished, and all crimes heretofore punished with death shall be punished by imprisonment for life; and in cases arising under this act the governor shall not grant pardons except on recommendation of the legislature. It is supposed that this act will secure conviction of persons charged with murder, who now escape by reason of the reluctance of juries to take life.

—THE production of wine in California has increased from 1,884,000 gallons in 1882, to 6,000,000 gallons in 1871—worth \$1,800,000. There was also made last year, \$300,000 worth of brandy, and \$600,000 worth of grapes were sold for table use. It is calculated that in five years the wine crop will exceed in value the wheat crop of this year.

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LABOR AND PRICE.

OUR labor and capital troubles spring alike from the misunderstanding of the fiction of Price—a misunderstanding which confounds the nominal with the actual. There is a failure to comprehend that price in itself is a mere name, the mere label of value, fluctuating according to fluctuations in exchanges of value, but never a substantiality, never a supply of human needs, never a production. It is a conventional representation of what is produced for the purposes of transfer. It does not signify anything intrinsic in respect to what it is affixed, but only the barter relations of the thing so figured. Though price as a practical arrangement may have its scale resting upon a basis of labor, we are prepared to say that price in the abstract has nothing to do with labor. The product of hand and brain is the same, allowing for natural changes, all the years of its existence; the price of it, the price it brings, is a matter of the passing moment. It was thus then; it is so now. This is not a matter to be disposed of by sympathy or declamation; it is not a question of charity or sentiment; it is the consideration of inevitable facts. We cannot “resolve” or sentimentalize necessity out of the world.

Labor makes value. In this we agree with the most pronounced communist or internationalist against the mere financier. All labor rightly directed, makes value; but the grade of value is according to the right and best direction of the labor. Labor in the wrong direction

may be pronounced valueless. There is, consequently, more value in skilled than unskilled labor, though in the varying conditions of price it might at times be rated less. Skill is the education of the brain and the education of the hand combined. Knowledge, therefore, is coöperative with work in producing value, and knowledge leads work as mind leads body.

Value, as the essential of compensation, is the equivalent of one labor for other labors; but the equivalence is not made by the one, but results from the interadjustment of all. No one labor can of itself make its own value; it is dependent upon the position of others; and the "others" are a multitude whom no man has numbered. Take the case of so simple a matter as coal. Yet even this, by the time it reaches the furnace to start other industries, has already embodied a score of labors. So, while the value of each laborer's work is made for him by the silent congress of workers, *so much* of your work on a hat for *so much* of my work on boots or plan, the latter can never evade the laws of that congress by clutching the bootmaker by the throat and calling for double the labor the bootmaker offers. Yet this is the principle underlying all strikes, which, in the case of the combination of a single class, is simply a monopoly against the equivalence of other producers in their relations as consumers; and when such combinations become universal, they set up the anarchy of caprice against the equitable law of compensation.

In this consideration it is not necessary to discuss the question of absolute value; if such value exists, its best verbal definition is, perhaps, ability to meet a want; yet the moment trial is made to set up this absolute value as a rule, the absolute is lost in the relative. The capacity to supply is rated according to degrees of want and the ability of the wanters. Labor with its own standard enters a field where a counter-standard is set up, and producers and buyers have each their freedom and each their subjection, and their rival claims fall under the adjustment of trade. Here is the office of commerce. If labor **makes** values, commerce makes prices, and commerce shifts prices in accordance with the ratio of each labor priced with other labors—*i. e.*, in accordance with the ratio of the products of one form of labor with the products of other labors, and all in subordination to the relations of society to each kind of labor. Commerce keeps up equilibrium among the respective workers, distributes surplus, supplies deficits, protecting one body of producers from the tyranny of others. Carlyle deems commerce king; we rather regard it as mediator. Labor we think kinglier than commerce; yet there is no denying the power of commerce when it, upon its own ground, arrays itself against the exercise of usurped authority by any division of labor. Labor can never wrench price from commerce;

and as is the price of the product, so is the price of the labor, under the very equilibrium which commerce makes.

In this inquiry we put aside all complications of currency with price, as touching nothing essential. If a hundred pounds of flour, a ton of coal, and thirty hours of work happen to be at a given time the commercial equivalents of one another, it does not affect their ability of equal interchange, if you call each of them 3, or 6, or 12; but, when with 3 as the figure of rating, one of these attempts to assert itself as 4 against the 3 of the other two, the trial ends, *when successful*, in calling the 3 by *another name*, and with another name the delusion prevails for a time that there has been a change in substance, which being at length felt, but not realized in its character, discontent begins again, and another name is called for. Two and one make 3, and we defy all the so-called labor reformers in the world to make 4 out of 2 and 1. Existing order may be disturbed, the means to supply everybody's needs made somewhat less, and the fashion be made to run as 4, 6, 12, or 20, but changing figures will not be adding things.

A fight is now going on, in which the assailant mistakes its foe. What is called the battle between labor and capital is really a struggle of labor against commerce or trade for the mastery of prices. Capital, as against labor, is a poor weakling tearing itself to pieces. Capital is accumulated labor, the reward of it, created by it. Its sole strength is in this, that by it labor conserves itself. The same dollar may be one of wages or of capital, but it is first capital, then wages, *and it is worth exactly in the hand of the employé what it is worth in the hand of the employer*. If the capitalist's dollar be made less in value, the loss is ultimately that of the workman. But the equilibrium of trade guards both employer and employed.

Commerce rates capital as well as wages, and it rates the former by the latter. To advance the prices of products in process, is to advance the price of products completed, though the latter have passed from the hand of labor. If a house built under the ten-hour rule cost \$5,000, and it will cost \$6,000 to build a like one under an eight-hour arrangement, the owner of the completed house is rated \$1,000 higher, with a proportionate increase in rent figures. His actual wealth, however, has had no enhancement; an adjustment has simply been made, by which all attempts to misrepresent the value, or rather the equivalence of labor in process, is defeated.

THE LATEST COMMERCIAL ASPECTS OF CHINA.

CHINA is with us a new commercial fact—an idea obscure and distorted, to be reformed and expanded. A land hidden from us by past barriers—among which were our own incapacities—and still barred from us and our activities by present obstacles. We know vaguely that there are about 200,000,000 people there, having learned to reduce an exaggerated census; that the area of country is about one-tenth of the habitable globe; and we have good reason to infer that of the world's natural resources fully one-tenth are there.

In the opening up of China to the outer world, the diplomacy and force of Great Britain have led the way; but in the great question of trade with China the United States have no secondary interest, and in the elements which make up intercourse with the Chinese people, are gaining daily.

Since the Chinese empire was opened up to travellers under Lord Elgin's treaty in 1861, says the *Quarterly Review*, the missionaries of science, of commerce, and of religion, have vied with each other in bringing obscure portions of the country within the domain of our knowledge, and the progress effected in China by the treaties of 1858 has imparted to these researches that essentially practical turn which is their distinguishing characteristic. It is China in its relation to the commercial systems of the world, from which it cannot much longer be kept apart, that has inspired the energies of its modern explorers, and these have already led to some valuable results. The information derived from such sources as Baron Richthofen, Williamson, Kingsmill, Markham, Oxenham, Wylie, &c., may, as far as our present purpose is concerned, be classified as follows:—

I. That a considerable amount of agricultural wealth, and an inexhaustible store of mineral wealth are not utilized in China.

II. That, with the exception of those districts which are embraced in the canal systems of China, the existing means of communication are of the most defective kind.

III. That there is still a large available opening for the extension of trade in manufactured goods.

IV. That the people are, as a rule, well-disposed, and anxious to cultivate commercial relations with acceptable foreigners.

A brief illustration of each of these four points will help to show the bearing of Chinese affairs on our prospective interests in that country.

I. The reports of travellers prove that, from one cause or another, large tracts of arable land are lying waste in several of the provinces of China. This is confirmed by native writers: for among the State papers which have been lately published are sundry memorials from high functionaries, who make the great area of unoccupied ground the basis of the administrative proposals which they submit to the supreme government. In places where the ravages of rebellion have been exceptionally severe, the land has ceased to be cultivated because the inhabitants have disappeared. The Taeping scourge, together with the means required to stamp it out, is said to have cost the country the incredible number of 50,000,000 of people, and the greater portion of the interior of the empire, though eminently suitable for grazing or tillage, is now a wilderness, beyond the ability or skill of the inhabitants to cultivate to advantage. For, though immense tracts of land are now in possession of few persons, only a limited number of square yards can be cultivated by each individual for want of the necessary manure, the supply of which within any given area is, owing to the defective system pursued by the Chinese, exactly proportionate to the number of human beings living on that area. And though the deserted regions of Che-kiang afford unbounded facilities for stock-farming, we are told that the Chinese agriculturalists have failed to discover the availability of so obvious a source whence the fertility of the soil might be maintained. On the northern confines of the empire, however, are vast forests which await the axe and the plow to be made to yield food in abundance, for the soil seems well adapted for agricultural purposes, and available as an outlet for the elsewhere redundant population of China. Where travelling facilities are exceptionally good, it is found that the resettling of the devastated districts is going on with comparative rapidity. In the province of Nganhwei, for example, which is watered by the river Yangtze, the number of immigrants is so large, that at times, only the twentieth man the traveller meets is an old resident, the new men being natives of several provinces, some near to and some remote from the land of their adoption. The government evinces so much wisdom in facilitating the repeopling of the country, and the emigrants adapt themselves so naturally to their new circumstances, that it has been supposed all this has been done instinctively in obedience to a national habit transmitted through many generations, during which the processes of devastation and resettlement have been regularly succeeding each other in China. And the periodical fusion of natives of various parts of the empire thus occasioned has been adduced as a possible explanation of the homogeneity of the Chinese people in language and character.

Both gold and silver are found in almost every province of the empire,

the former being procured chiefly by washing the sand of river-beds, which are recharged by every flood and freshet. It is a laborious, and not a very lucrative process to the persons engaged. Mining is not altogether unknown, though it is discouraged by the jealous policy of the government; the quartz is reported to be very rich in gold, and nuggets are met with in certain districts. Of the copper, lead, tin, and quicksilver production, scant information has as yet been furnished. The salt wells of Szechuen are of high repute, and there also are petroleum pits reported to be 3,000 feet deep. The oil, though most abundant in Szechuen, is likewise found in the province of Shansi. These are all, however, comparatively unimportant from an external point of view, and foreign investigators have concentrated their attention on coal. This is at once the most valuable, the most widely distributed, and the most accessible of all descriptions of the buried wealth of China.

The Chinese coal fields cover an area of upwards of 400,000 square miles: 12,000 miles of coal have sufficed to make Great Britain the greatest workshop of the world. In the province of Hunan a coal field extends over an area of 21,700 square miles. There are two perfectly distinct coal-beds in Hunan, one bearing bituminous and the other anthracite; the latter being most conveniently situated with regard to conveyance by water, easily mined, and covering an area equal to that of the anthracite coal fields of Pennsylvania. In quality this coal will compare favorably with the best kinds of anthracite known.

The coal area of the province of Shansi is the enormous extent of 30,000 square miles. This is capable of supplying the whole world, at its present rate of consumption, for thousands of years, and has unrivalled facilities for mining. The beds vary from 12 to 30 feet in thickness, while the system of coal-bearing strata in this province is about 500 feet in thickness, and contains, besides, an inexhaustible supply of iron ore. Ping-ting-chau is conspicuous for an extraordinary and exceptionally favorable juxta position of coal and iron.

Of the various kinds of iron ore which abound in several strata of the coal formations of Shansi, Baron Richthofen mentions only one as being used by the Chinese. It is "a mixture of clay iron ore and spathic ore, together with limonite and hematite, and occurs in irregular accumulations in certain limestone strata at the bottom of the coal formation." The native modes of melting the ore is minutely described by the baron, who does not hesitate to acknowledge that, rude and feeble as the machinery is, the iron produced is of excellent quality, a result which he attributes, in a great measure, to the superiority of the raw material. "The few hundred feet of coal formation furnishes an abundance of every kind of material required: first, an iron ore of great purity, rich

in metal and easily fusible; second, all sorts of clay and sand, such as are required for crucibles, moulds, &c.; third, a very superior anthracite."

Yet with a people the most numerous, the most industrious, the most orderly in the world, and at the same time keenly alive to their own interest, when they are made aware of the direction in which it lies, these vast stores of coal and iron are turned to no account. A local trade in coal is carried on in Szechuen province, in the northern province of Chih-li, and in Manchuria, and, of course, in most other places where coal is abundant; the product of Hunan is even worked sufficiently to feed small distant markets when they happen to be situated on the banks of rivers on which laden boats can be floated. But the only Chinese mines which can be said to be worked in a business-like manner are those in the island of Formosa, whence, under the stimulus of European aid in mining and shipping appliances, a regular export trade in coal of a poor description is carried on with the mainland. The traffic in native iron seems to be even more restricted than that in coal. This state of affairs would appear less anomalous if it could be shown that the domestic and industrial habits of the Chinese were such as enable them to dispense with valuable minerals like coal and iron. This is not the case, however; for we learn that in the very country where coal most abounds, so desperate is the need for fuel, that the climate has been ruined by the cutting down of all trees and brushwood, and even the roots of grass are diligently dug up to supply firing for domestic purposes.

We know also that, in spite of the enormous disadvantages under which such a commercial operation must be conducted, both coal and iron are sent in large quantities from England to China, while of coal still larger supplies are drawn from America, Japan, and Australia, a certain proportion of all which is for exclusively native use. That articles of so low a monetary value as coal and iron should, after being carried over 15,000 miles of ocean, compete successfully, on their own ground, with the native products of a country which is itself an inexhaustible storehouse of these very commodities, is a fact for which it would be difficult to find a parallel.

II. China is well known to be possessed of an unrivalled system of water communication, which, cutting up the lower portion of the great basin of the Yangtze into innumerable insular blocks, furnishes at once a means of transport which, if slow, cannot be surpassed for safety and cheapness, and a convenient method of irrigation. This network of canals, however, covers only a comparatively small area of China; and though next to the canals the navigable rivers appear to offer great facilities for the transport of merchandise, the primitive mode of navigation,

which is alone at the disposal of the natives, causes half the advantages of these magnificent water-ways to be lost. It is only, indeed, where foreigners have been permitted to run steamboats that the Chinese are enabled to make full use of their rivers; and as the knowledge of the Chinese of the construction of roads does hardly embrace the first principles of this branch of engineering, and as they possess neither skill nor energy in removing obstacles, but are endowed with an infinite amount of patience in overcoming the same natural difficulties day by day, they have never attempted to improve their means of land communication.

The roads may be said to be in a state of nature—no one looks after them—nor is there any toll, except at the passes leading into Mongolia. The weather rules them. In the level districts they are just lines of deep ruts, irregular and uneven, which in course of time would become utterly impassable. But the rain obviates this evil by washing them all into a common puddle, when it ceases. Carts then plunge through them, leaving no tracks. The sun hardens them, and this process of repair is perpetually repeated, and it is all they receive.

The first result of this state of things is that the rudest conveyances can alone be used over immense tracts of country. The two-wheeled vehicles which laboriously perform the carrier service in Chih-li and Manchuria, give place to those one-wheeled carriages which are found in the central provinces, and these again are forced to give way to beasts of burden in the hilly districts, as well as in other regions where the roads have become impracticable even for wheelbarrows. The mere description of the mode of propelling these, the popular locomotives of central China, sufficiently attests the incalculable waste that is implied in the use of so inconvenient a means of transport. Crossing some uncultivated chalky downs in the province of Honan, where the roads were good, Mr. Oxenham came upon large numbers of wheelbarrows; and in one place where the country was unusually high and open, and where a strong wind was blowing in their favor, all of them set up a sail to assist them in their journey. The men who use these cumbrous and loud-shrieking vehicles contrive to make about 20 miles a day, and in the event of a favorable wind, often 30. One man generally manages the wheelbarrow, though he sometimes avails himself of the services of his son, his wife, or his donkey. No laborer in the United States or Europe probably undergoes an equal physical strain to the Chinese barrowman who seldom reaches the age of 40 years. But besides this waste of men, it is surprising to see what a large number of mules and horses are employed in the carrying trade, and how great a proportion of the agricultural land serves only the purpose of feeding these animals. As

the service which is done by a horse in the northern provinces is probably, on an average, not more than one-fifth of what it could be on well-constructed roads, it may be said that about four-fifths of the area of the fields retained for raising food for cattle is wantonly lost to the cultivation of other crops. Freight by land is from twenty to forty times more expensive than by water, and with heavy articles like iron and coal, but especially coal, the cost of carriage of which forms so large an item in their price to the consumer, it is easy to see how the roadless condition of the country effectually precludes the working of the mines. We read that in the province of Shansi, coal which costs 1s. per ton at the mine, rises to 24s. at a distance of 30 miles, and to over 42s. at a distance of 60 miles; that only those who live in close vicinity to coal mines, derive any benefit from them, while to others, who live at a day's walk from the mines, coal is a luxury for which they cannot afford to pay.

In portions of An-hwei province, although close to the banks of the Great river, the people do not even grow the crops for which their soil is peculiarly adapted, because they have no accessible market for their surplus, though there are large urban populations within 100 miles. A like state of things appears also to exist in Hunan; while of Shansi we read that the Chinese consider that one good crop furnishes sufficient food to last during ten successive bad years—an exaggeration, no doubt, but one which sufficiently indicates the fact that in Shansi no means exist of disposing of the surplus produce. Such facts enable us to understand why famine is a chronic scourge in China. With various soils and a capricious climate, scarcely a season passes in which some portion of the empire is not visited by drought or inundation; and when either happens in a roadless district, unless the local authorities have laid up stores of grain from the abundant harvests of previous years, from which they can dole out allowances to the sufferers, the people may, and do, starve, as if they were in a besieged city, with plenty and to spare all round them.

It is not possible to express by any money equivalent the real burden thus laid upon commerce. The length of time consumed, and the difficulties and real hardship of the journeys, tending as they do to discourage travelling, must exert an important, though impalpable, deadening influence on trade, by preventing that free interchange of information between buyers and sellers which is essential to the initiation and conduct of business. In a country which possesses no adequate advertising media it may easily happen that a consumer of a given commodity does not know whence to supply his wants, while the producer is at a loss where to find a purchaser; in the one case perhaps an inconvenient, and therefore expensive substitute is resorted to, and in the other further

production is discouraged. Intensely commercial as China is admitted to be, and keen and accomplished as are its merchants, there seems yet room for much mutual ignorance of this kind.

III. To the economist China is a picture rich in the opportunities afforded by cheap labor, and a field of consumption yet unoccupied, because as such yet in germ; but in an elaborate *resumé* of commercial affairs in China, dated May 19, 1869, the meagre trade with that country by the London board of trade is attributed to the circumstances that "the population of China is for the most part in a condition of extreme poverty," "is deficient in the *desire* for the material comforts and elegancies of life," and that, moreover, "China produces all the raw materials of industry, and with her teeming and laborious population possesses great manufacturing power as regards the principal articles required for her internal consumption;" whence "it appears very doubtful whether the coarse cottons which are the only manufacture largely exported from the United Kingdom to China * * * * can ever do more than supplement the native production in the supply of the great cities accessible to foreign trade." Yet thirty million pounds of tea—an article which the board of trade pronounces to be of "primary necessity"—yielding £750,000 of revenue, were added to the annual importation of Great Britain as a consequence of the stimulus imparted to the trade by the opening of the river Yangtze; and English exports of manufactured goods to China have been trebled under the operation of the treaty of Tientsin. According to the Shanghai chamber of commerce, the export trade from the United Kingdom to China in 1858, the year in which Lord Elgin concluded his treaty, had reached the maximum of £2,876,447. It now stands at £9,000,000, the increase being claimed solely as a result of the treaty.

And the means by which this has been accomplished are plain. Free communication and steamboats have done it all. And the benefits of steam traffic on the north China coast and on the river Yangtze are inadequately expressed by the extension of foreign trade which has ensued: the natives are reported to have gained much more, for they are the principal owners of the cargoes which are carried by the foreign steamers, while the face of the Great river is stated to be covered with small sailing craft, which either serve as collectors and distributors of the steam traffic, or make longer voyages, carrying the coarser kinds of merchandise under that security from piracy which the constant passing of steamers undoubtedly affords.

Such being the result of the measures of 1858, the question arises, is no further progress in the same direction possible? And here we are reminded by the memorials of the merchants that the navigable rivers

above Canton are still closed against foreign steamers, and that the trade channels communicating with the river Yangtze through the Poyang lake are in urgent need of steam service. The Siang river and the Tungting lake channels southward, and the Han river northward from the great central mart Hankow, have likewise been put forward as desirable steam lines, under the impression that they were navigable, which they are only to a very limited extent. Then the Upper Yangtze, for a distance of 360 miles between Hankow and Ichang, is described as well adapted to steam navigation, forming the natural highway through a fertile country, and connecting the wealthy province of Szechuen in the west with the great commercial system of the empire. Since the navigation of the river by steam, 600 miles from its mouth to the central point Hankow, has created so much trade, it seems to follow that to extend the system for the remaining 360 miles of stream navigable by ordinary river steamers, would also be beneficial in a proportionate degree. In weighing the probabilities of such results, however, it is necessary to bear in mind that we should no longer be dealing with the trunk line of traffic, but with one out of the three great branch lines which converge at Hankow as their centre. It is in the gradual results of the adoption of steam on the inner waters generally, rather than in any sudden revolution in trade, such as was caused by the opening of the Lower Yangtze, that the outer world should expect to realize the full benefit of such a measure.

But the thought which seems to obtrude itself most forcibly on all classes of travellers, in presence of the actual obstacles to commercial prosperity in China, is that of the introduction of railways. The unanimity with which this point is put forward is remarkable. Baron Richthofen, whose language is always guarded, is unable to withhold his strong testimony in favor of railways, and his conclusion meets and overcomes all the arguments of the London trade board, viz.—the introduction of modern means of conveyance suggests itself as a step which will be attended with *incalculable change of conditions*.*

* The managers of a telegraph company in China have recently solved the problem of how to transmit telegraph messages in Chinese. At first, difficulty of an alphabet of about fifty thousand distinct characters appears insurmountable, but the obstacles have been overcome, and A-Wing at Hong Kong encounters no more difficulty in communicating with A-Chum at Shanghai, than do Brown and Jones under similar circumstances. The plan adopted is this: Some few thousands of the more common Chinese characters are cut on wooden blocks, after the manner of type, and on the reverse end of each is a number cut in the same way. Now A-Wing having handed in his message written in Chinese, the native clerk selects in order the corresponding block from the case, and prints off their numbers on their reverse. This he hands to his English colleague, who telegraphs the number to the destination desired. Here the reverse process is gone through, and the numbers having been taken from the cases, the characters are stamped on paper, and thus A-Chum is put in possession of the cherished wishes of A-Wing through the medium of his native language.

IV. In considering the means which are available for bringing about the desirable consummation we have indicated, we are met on the threshold of our inquiry by the thought that we have to deal with the interests, the customs, and the educated prejudices of some 200,000,000 of human beings. To attempt to force innovations into such a country, against the inclinations of the people, would manifestly be as impolitic as it would be impracticable; and it is, therefore, important to seek any information that may be accessible concerning the disposition of the Chinese towards foreigners, and the spirit in which they would be likely to hail any of the material improvements that seem to be so much wanted. Nay more, vested interests deserve fair consideration, even where the temporary interests of the few militate against the permanent interests of the many. No great change can be introduced into a settled populous country without inflicting some injury; but innovators are bound to study the minor as well as the major effects of their measures, and to reduce the prejudicial action to a minimum. In the present case there is no safer—indeed, no other—guide than experience, and that shows the Chinese to be most willing to use the facilities for locomotion and transport which the Europeans have put within their reach. The steamers, both on the coast and on the rivers, are loaded with Chinese cargoes and crowded with Chinese passengers; and the very natural fear that steam would throw large number of sailors and boatmen out of employment, and thus create embarrassment to the authorities, does not appear to have been well founded: at least, the only discontent of the unemployed, that we hear of, comes from districts not directly affected by steam navigation. It is like straining at a gnat to speak of the possible supercession of the mule-drivers in the coal districts by a more efficient system of mining and carrying; but it appears that the iron-workers of Shansi have already been, to some extent, supplanted. Incredible as it seems, Baron Richthofen is of opinion that “it is possible the introduction of foreign wrought-iron into those districts which are accessible by water from the treaty ports, has greatly reduced the amount of sale and total production of Shansi iron;” that is to say, that Staffordshire already beats Shansi on its own ground.

The friendly disposition of the people is sufficiently attested by the fact that travellers perform their long journeys through the interior of the country with no apprehension except—and that rarely—from robbers. The populace of Hunan has enjoyed the reputation of harboring the strongest aversions to foreigners; but, though frequently complaining of incivility, travellers have heretofore passed through that province unharmed. Nor is it tolerance, merely, but sympathy and welcome, which foreign visitors meet with in the interior of China. A desire on

the part of the native population to enter at once into commercial relations, as we learn from the delegates of the Shanghai chamber of commerce, was a characteristic feature of their reception in the great cities of the interior. And even the itinerant agents of Bible societies, in the course of their long journeys, find an eager demand for the publications which they carry with them for sale.

Thus, then, the recent writers whom we have followed, who testify what they have seen, unveil a magnificent field for the spread of commerce in China. Four distinct classes of them agree on the means by which the field may be cultivated, and they are equally unanimous in their testimony that no serious obstacle would be likely to proceed from the mass of the people concerned. And so far as the hostility of the governing body is concerned, nothing better illustrates the future of this than the fact that in the Chinese government there are now two parties on the question of policy toward foreigners. Chinese exclusiveness to-day is more official than popular.

THE TEACHING OF ENGLISH LITERATURE.

IT is no slight thing to plan a course of education. Or, if it is, it should not be. For it is not merely a selecting of grammar books and the like that is required; it is an assembling together of all intellectual and moral forces deemed fittest to act on mind and character. Even in the poorest minds, there lie unperceived a multitude of germs which will never be more than germs, but which are nevertheless capable of expansion to growths of use and beauty. What training is best fitted to awaken and develop them? This is a question far too important to be relegated to men whose powers are absorbed in the monotonous drudgery of ordinary pedagogy. It is comprehensive; it is fundamental. There is nothing which needs higher thought. The paramount work of this generation is the training of the next. Here are millions of youth whose main business now is to fit themselves under our guidance for the infinite possibilities of the future. What can we do for them? What should we try to do?

Of the many true and striking thoughts which have been given to the world on this subject, none seems to us more true, and none is to us more striking, than the following from Prof. Seeley, of Oxford: "That the common spirits among men should pass under the influence of the greater and rarer spirits, this is the chief thing for us to aim at."

Here is at once an axiom and a guiding principle. We cannot secure that all teachers shall *be* great men; but, if we are in earnest about it, we can secure that they shall direct their pupils *to* great men. And there is no other agency in instruction equal to this. A familiarity with high thought extends the sympathies, refines the taste, strengthens the reason, and elevates the imagination. "I like people who like Plato," says Emerson. Indeed, it is not possible to conceive of anything better fitted to enlarge the mind than to consort with the greatest men that have ever lived, and to take them too at their best; in other words, to read what they have written in their choicest works.

We who speak English are proud of our literature. We hold that few, if any names, of whatever age or nation, deserve a higher place on the scroll of fame than those of Shakspeare, Bacon, and Milton. To know and to love the writings of men like these is culture, is refinement; to be ignorant of them is to be scarcely civilized.

Now a college is a seat of learning whose rightful office it is to bring the best possible influences to bear upon the minds of young men during four years of their early hopeful activity, while their working character is being most effectively formed. This is attempted mainly by means of books, which they are directed to study, various contrivances, tests, and regulations being adopted to see that they do so. It would naturally be supposed, of course, that masterpieces written by the great English writers we have named, and those who stand next to them, constitute a rich store of material from which books of instruction should be selected. If there is a general consent as to what are the best authors in the language, there can be no difficulty, one would think, in determining what the student is to be set to work at. Yet what are the facts of the case? "Assuredly," says Prof. Lounsbury, (of the Sheffield Scientific School, Yale,) "it is no wild statement to make, that in many of our colleges a man might go through a four years' course, and never once hear from the lips of any of his teachers the names of Shakspeare or Milton; and there are still very few of our schools in which he would ever be reduced to the necessity of reading a single line of their works." And the same may be said of Addison and the rest. But, incredible as this state of things may seem *a priori*, nobody is surprised or indignant at it in reality. We have become so thoroughly accustomed to it, that nothing seems more natural to us, and we are inclined to smile compassionately at the rash thought that it might usefully be otherwise.

Yet it is strange that this should be so: for the the value of an intimate acquaintance with the works of great authors is continually urged upon us in connection with this very subject, the studies proper for a collegiate course. One of the arguments most strenuously urged to

justify the large expenditure of time in teaching Latin and Greek is, that by this instruction the student's mind is impressed by the masterpieces of antiquity—is familiarized with the thoughts of Homer and Plato, of Cicero and Virgil. Whether or not this is truly the case is nothing to the purpose. We admit that many students are so disgusted by the dry and toilsome manner in which they are obliged to study the dead languages, that they are disqualified to appreciate their beauties, and, on leaving college, rejoice in being never more for the rest of their lives obliged to look into a Greek or a Latin book. We admit, also, that so large a proportion of their time is taken up with minute grammatical analysis as to preclude the possibility of a wide and worthy study of the really great literatures of Greece and Rome. But this, we say, is nothing to the purpose. Our assertion is simply that the value of those literatures in elevating the mind is widely and ably urged, while the value of our own noble and easily attainable one is seldom thought of. Indeed, we know of but three men who have adequately expressed their sense of its being an appropriate subject for collegiate instruction—Prof. Seeley, of Oxford, Prof. Lounsbury, of Yale, and President White, of Cornell university: from the last named we cannot forbear quoting a sentence admirably embodying the most catholic views on literary culture. "It is impossible to find a reason why a man should be made Bachelor of Arts for good studies in Cicero and Tacitus, and Thucydides and Sophocles, which does not equally prove that he ought to have the same distinction for good studies in Montesquieu and Corneille, and Goethe and Schiller, and Dante and Shakspeare." In this opinion we fully coincide. We do not wish to sweep away Latin and Greek, but to add French and German, Italian and English. In so far as any of these is ill taught, we would welcome every appliance of culture to encourage its growth. We confine this article to our own literature, because it has been so entirely overlooked, notwithstanding the fact that none other can ever be so important or so interesting to us.

And now we wish further to enforce our assertion that English literature has been almost entirely neglected in our colleges, by distinguishing it from English philology. Grammar is one thing, and communion with a great mind is another. In some of our colleges, more now than formerly, there is a professorship of the English *Language* and Literature; but in its actual working, the language alone is really taught. We may best illustrate this by a reference to the course of Prof. March at Lafayette college, which "claims to have been the first college in the country to establish a separate professorship for the philological study of English, and to elevate it to its proper rank by associating it with comparative philology, and making it the centre of the study of lan-

guages." The college catalogue says: "An English classic, Milton's *Paradise Lost*, for example, is studied just as the most skilful professors of Greek teach the *Iliad* of Homer. The text is minutely analyzed, the idioms explored, and synonyms weighed; the mythology, biography, history, metaphysics, theology, geography, are all looked up: and whatever else is necessary, that every allusion may be comprehended." Prof. March has informed us, in a personal letter, that he devotes one term to parsing, (much more analytical and profound, we believe, than what usually goes by that name,) one to Bunyan's *Pilgrim's Progress*, and one each to Milton, Shakspeare, Spenser, and Chaucer. He has shown his manner of teaching by his book called *Method of Philological Study of the English Language*, published in 1865. Here he has set down questions on a few sentences from Bunyan and Milton, exactly, he tells us, as he asks them in the class-room. We find by actual count that there are 156 questions on the first sentence of the *Pilgrim's Progress*, accompanied by 98 references, mainly to Fowler's *Grammar*, but one requiring the study of eleven pages of Becker's *Syntax*, and another, six pages of a rhetorical text-book. This alone, one would think, is a long lesson; and, when the pupil comes to Milton, with his wealth of classical allusion and his periods of learned complexity, we wonder that Prof. March can, as he says he does, get through ten lines in a single recitation. We do not question that an exercise of this kind is excellent mental training; our object is to distinguish it from literature. It is philology; Prof. March calls it philology; and he connects it with Anglo-Saxon, viewed in its relation to Latin, Greek, Sanscrit, and the other Indo-European languages. It is scarcely necessary to add that the memorizing of text-books on rhetoric and the production of original compositions, which are also generally included in the "English" course, where such a course exists, are equally distinct from a study of the great thoughts of great men.

But now we come to a kind of instruction far worse than even the wide-spread neglect of our literature; that is, an attempt and pretence to teach it, which is, however, nothing but a failure and a fraud. In some of our colleges, and a great many of our high-schools, academies, and seminaries, a study called English literature is really kept distinct from grammar, rhetoric, and composition. But the title is a misnomer. As a general thing it is not English literature that they teach. For, what is it to teach English literature? What is it to teach anything? What is it to teach chemistry, for instance? Is it to require the student to memorize for each lesson so many pages of a text-book containing brief, yet tedious abridgments of the lives of eminent chemists, with lists of the discoveries they made and the books they wrote, finished off

with critical opinions, *ex cathedra*, on their relative merits and character? Everyone would scout such an idea as preposterous. Everyone knows that to teach chemistry is not to cram into the learner's mind statistics and opinions *about* chemistry, but to make him acquainted with the science itself, to begin with its elements, to show him the very actions and reactions which constitute its subject matter, and to set him at work in the laboratory to learn chemical phenomena by sight, hearing, and touch.

But what is the case with regard to English literature? The text-book system is almost the only one in vogue, the book most in use being, perhaps, Shaw's *Outlines of English Literature*, a work which, however, contains no English literature at all, consisting almost entirely of uninteresting remarks on English authors and their works. Take the paragraphs relating to Burns, for example. They comprise a brief statement of the leading facts in his life, written in the style of biographical dictionaries, the names of eight of his principal poems, and about a page of criticism, from which we learn that his works are "various," "splendid," "pathetic," "droll," "inimitable," "familiar," "elevated," "admirable," "poetical," "beautiful," "sublime," "tender," "muscular in expression," &c., &c., &c. Not that these epithets are given in a string, as we have here placed them; they are, of course, woven into sentences of more or less meaning to anyone who knows the things which they refer to. But we must insist upon it that they give no information, and impart no idea of the poems themselves. Why tell anyone that the verses *To Mary in Heaven* are beautiful, and *The Cotter's Saturday Night* admirable, when you can read those poems to him, or set him to reading them for himself, and thus teach him exactly what they are? He does not learn anything of value about them by being told that they are beautiful or admirable. If such a remark would indeed induce him to read them, it would not be useless; but we fear the continued memorizing of criticism without any knowledge of the things criticized, excites aversion rather than curiosity. Good criticism has its function. When a student has read the work criticized, it may instruct him or guide him in his analysis, but simply as an opinion without the basis of the particular judgment, it is next to worthless, and—criticism as an end—criticism to be "crammed"—what is that good for?

The only candid answer to this question must be—For show! And those who carry on such instruction must be mainly influenced by this consideration. They may not state it with perfect definiteness to themselves, but they must feel at bottom a dread of their graduates *appearing* ignorant of the leading authors who have written in their own language. Of their *being* ignorant of the same, very little account is taken. Young

men and young women are taught to commit to memory the names of great writers, with accompanying dates, lists, and criticisms, so that in future they may be able to speak of these writers *as if* they were really acquainted with their works. Thus they are sent out into the world under false pretences, educated into a habit of palming off words for knowledge upon those with whom they converse—a process which involves more or less degradation of their moral nature.

Besides, false pretensions are almost sure in the long run to be exposed. "Studies serve," as Lord Bacon tersely expresses it, "for delight, for ornament, and for ability." Now it is evident that if they are pursued for delight and ability, they will infallibly become an ornament; but, if the ornament only is sought, it will be found unattainable—the tinsel will here and there be rubbed off, and expose the rags beneath. When a man uses in company the phrases he has learned about authors of whom he really knows nothing, he can scarcely avoid at times betraying his ignorance; and thus the ill-meant, superficial course of study to which he has been subjected defeats its own object. It is worse than nothing even for show; for silence may pass for wisdom, but pretence, when discovered, is covered with ignominy. Besides, a consciousness of his own ignorance may lead a man to a true course of reading for the purpose of remedying what he feels to be a defect in his education. Hence it seems to us a sad sign that text-books of the kind we have referred to are visibly on the increase—the last we have seen being perfectly fearful in the great number of authors named, the purely statistical character of the biographical sketches, and the brief dogmatism of the criticisms. Indeed, the latter are so numerous and extensive that not only is it impossible for the student to judge of their correctness, but the author himself cannot have done so: he must have adopted most of them from preceding works, without any real knowledge of their truth and adequacy.

But, it may be asked, what is to be done? The field of English literature is so vast, and the time of instruction is so short, that it is impossible to do more than give the critical outline which is given. Well, the first thing to be done is to omit that. Ceasing to do evil is an indispensable preliminary to learning to do well. The next thing is to clearly conceive and always keep in view the end to be desired, namely, the bringing of ordinary minds under the influence of rare and great ones. Various means will then suggest themselves, by which the time allotted to the subject may be truly spent in accomplishing this purpose. It might be a judicious arrangement to have the masterpieces of English literature read aloud to a class by a good reader for an hour or so every day. A few well-considered criticisms might be given, either original

or carefully selected ones; and such explanations should be given as are necessary to secure a perfect understanding of the text. But it is easy to give too many explanations. They have a fascination for teachers, and tend to expand so as to swamp the work which is really the object of study. Hence, M. Comte, in his course of reading for mankind in general, insists that all editions of standard authors used shall be without a single note. This may be going too far. When, for example, Milton speaks of "Scylla bathing in the sea that parts Calabria from the hoarse Trinacrian shore," a few words seem necessary to explain the allusion to a class; but it would be a sad waste of time to recount to them, or to have them ferret out for themselves, all that can be found on the subject in classical dictionaries and other kindred works. Let that time rather be devoted to Milton himself. It is a sign of progress in the right direction that two large publishing houses are now engaged in bringing out editions of separate plays of Shakspeare, with a comparatively limited number of notes (though still too many), expressly for use in schools. Nine plays are now issued by one of these houses and four by the other. It cannot be too much insisted on that the value of notes lies not in the additions of knowledge which they constitute, but solely in the elucidation of the author's meaning. When they are given for their own sake, the instruction becomes merely a lesson in philology, antiquities, mythology, geography, or some other subordinate subject, which should not be allowed to encroach upon the already too meagre time allowed for the study of a great literature.

Instead of making literature thus auxiliary to other branches of instruction, we would now and then make them auxiliary to literature. For instance, composition might often be made so without losing any of its own value. Let a student be directed to bring in on a certain day a critique on Pope's *Rape of the Lock*, and he will necessarily read Pope's *Rape of the Lock*. A school library is also an important element of culture, now sadly neglected. Prof. Buckham, of the University of Vermont, says, "It is my experience that young men in college, at least for the first two years, desire to have their reading selected for them, and I may say that I think it a good plan, on this account as well as others, to make the professor of English literature also the librarian."

It seems to us that by keeping the true end of such instruction always in view, much might be done, even in the limited time now allowed to the subject, towards making our students acquainted with good literature, teaching them to discriminate it from bad, and inspiring them with a genuine and ardent love for it. By merely requiring them to read a certain amount of it at home, and examining them, not too closely, on the part thus assigned, they would be led to it by a sort of gentle con-

straint, and it would take the place of the wretched stuff that, it is to be feared, fills up so large a portion of the time which is now at their own disposal. We have enough faith in the charms of good literature to feel sure that, once familiarized with it, they would inevitably come to appreciate its beauty and power, and would soon acquire a taste that could not be satisfied with any other.

Much of this, we say, might be done even now. But more time for English literature is imperatively demanded. We believe it will be gradually increased. But here is the importance of disseminating correct opinions as to what is desirable: every man has some influence, and, if prepared with definite views which he is able to support, may at some time find an opportunity of bringing about an important advance in the right direction. What is most needed is attention to the subject; and if it could be set fully in the view of all who are capable of appreciating its broadest aspects, we would soon see Shakspeare taught rather than Shaw, Bacon rather than Blair, and a thorough and extended course of study allotted to the great English authors in all our schools.

FROM DENVER TO THE CITY OF MEXICO.

PERHAPS the most puzzling problem of the day is—What ails Mexico? and what can cure her? It is now about fifty years since the yoke of Spain was broken by a successful revolt of the colonists; and at that day the world hailed the “new nation” with jubilant shouts of congratulation, and looked confidently for a degree of progress even surpassing that of the United States. Rich in mines, rich in soil, washed on both sides by the two great oceans of the globe, her broad interior table-land lifted above the heats of the tropics, giving it the perpetual spring, summer, and autumn of the temperate zone, it was, and not incorrectly, regarded as the most highly-favored region on the globe. Surely such a country, independent and free, ought to advance rapidly in population, wealth, civilization, and everything that can make life desirable and a nation great. The world did expect great things of Mexico when she took her place among the free States of Christendom.

But the world in this has been sadly disappointed. For half a century Mexico has been alternating between violent political convulsions and social paralysis. In population she has hardly advanced at all; in wealth she has retrograded fearfully; while in territory she has shrunk to half her former area. So rapid a decadence is without a parallel in history.

Mexico has demonstrated that national independence is not freedom; that constitutions cannot be made; that boundless natural resources are not wealth; that a form of christianity is not religion; that a people placed in an earthly Paradise may be wretched and insecure; and that it is real MEN, not human animals nor things, which constitute a State. It has shown us that nations as well as individuals may be so diseased that nothing less than new life brought from without can effect a recovery. In the present stock it is plain that there is not sufficient recuperative energy to enable that country to rise to the status of a healthy and growing State.

How is the only possible remedy to be applied? The physical conformation of the country is very peculiar. It is a broad and magnificent plateau, bounded on the long gulf coast by a low, broad, hot, miasmatic belt, over which civilization and energy can never flow; so Mexico cannot be rejuvenated by way of the sea. Its immense interior is one great table-land, fertile in soil, temperate and salubrious in climate, where wheat and the orange, the coffee-bean and the peach, may grow side by side; where splendid valleys lie under the shadow of snow-clad peaks; where are found the richest silver mines in the world, and where an agricultural, pastoral, mining, manufacturing, and commercial people could mingle together. This great central plateau reaches northward and eastward into our national territory, so that that grand and salubrious interior of old Mexico can and will be reached by that avenue—not by sea-going vessels, but railroad trains; not across the low, stifling, enervating, death-dealing maritime belts, but over that lofty region which is as favorable to the health and energy of man as is any part of the temperate zone.

By the treaty of Guadalupe Hidalgo our government acquired possession of an immense belt of territory extending from the great plains east of the Rocky mountains to the Pacific, including what are now California, Nevada, the greater part of Utah and Colorado, all of New Mexico, and all of Arizona. Over it were scattered feeble Mexican settlements, poor and non-progressive, very much like the sparsely-settled northern States, which Mexico retained. All of that territory so acquired by the United States, so far as it has been reached by sail or by rail, is this day exceedingly prosperous and progressive; and all will be as soon as railroads shall be extended into them. They are agents of prodigious power, and are rapidly revolutionizing all human affairs, carrying life and energy into the far interior of continents, and building up cities surpassing in opulence and commercial activity any that mere floating commerce ever brought forth. By them, and not so much by maritime channels, will the new life which Mexico needs flow in.

Already we see the beginning of this work, and the road which is destined to be the first to penetrate to the heart of that magnificent interior plateau is rapidly progressing.

When the Denver and Rio Grande railway—three feet gauge—was originally projected, El Paso, on the Rio Grande, just on the line dividing our national territory from that of Mexico, 260 miles south of Albuquerque, and about 340 south-west of Santa Fé, was its objective point. But before it reached the Arkansas, and in less than a year from the time when the first blow upon it was struck, gentlemen from the City of Mexico were up in Colorado negotiating with the company for its continuance from El Paso to that city, across the intervening table-lands. From Denver to El Paso is about 750 miles, and thence to the City of Mexico is not much short of 1,000 miles, making in all a line of about 1,750 miles in length, nearly the whole of which will be at an average elevation of 5,000 feet above tide, and of course through a temperate, healthy, and delightful climate, and through a region of immense resources both mineral and agricultural.

The capital with which this work is prosecuted is drawn in part from Philadelphia, but chiefly from Holland and Great Britain. The government gives no subsidy whatever, either in lands or bonds. The company has never asked for any; but it has purchased from individuals extensive tracts of land—some of which consist of hundreds of thousands of acres—held under old Spanish grants, the validity of which congress has recognized and confirmed. In this way it has come in possession of much mineral territory of great value, but which is only made available by this road. It is very probable that the Denver and Rio Grande road will add more to the wealth of the nation, by opening up a vast mineral region, than any other single road in the country. Coal, iron, copper, silver, and gold, all exist in great abundance, together with fruits and other products of the soil, embracing those of both the temperate and tropical zones.

But this will not be the only road which will penetrate that great Mexican plateau, although it is likely to be the pioneer; for, already, men who are able to push the work rapidly on, both in this country and in Europe, are becoming very much in earnest about it. Gen. Wm. J. Palmer, the president of the road, has been in Mexico for several months, most of the time in the capital; and it is not likely that he will return until the whole programme is made out.

Why, it may be asked, make a line of railroad of such magnificent dimensions a three-foot gauge? The answer is: That country is very different in its conformation from this with which we are familiar. Here, where a stream has broken through an interposing mountain or

hill, it has generally cut a gap or valley of considerable width; but there the confined gorge or cañon is the rule, the stream having by long-continued abrasion worn away the rocks to a depth of hundreds, and sometimes thousands of feet, so narrow as only to leave room for itself, leaving the sides like two great and almost perpendicular walls. It is true that on the main line of the Denver and Rio Grande road there are few, if any, such defiles; but to reach the numerous mineral regions would require the construction of branches through such places. Some of these cañons are extremely tortuous, requiring curves too sharp for wide-gauge roads.

But it is strongly contended by many engineers of great ability that for any country a gauge of three feet is better economically than the common gauge of four feet eight and a half inches. Mr. Farlie, an eminent British civil engineer, who has identified himself thoroughly with the narrow-gauge interest, argues that three feet is the true medium; that it gives sufficient capacity, while it reduces dead-weight to the lowest proportion consistent with safety. For such a road as the Pennsylvania Central, where the traffic is so enormous, doubtless the wider gauge is better; but where the trade is limited, as it is on nine-tenths of all the roads in the country, the dead-weight in capital, and the dead-weight in moving tonnage, on the wide gauge, are enough to render them non-productive of dividends, when, with the cheaper structure and the lighter trains, they would pay well. It was unquestionably wise, therefore, on the part of the Denver and Rio Grande company to adopt that gauge. Their trains run admirably, and they have already demonstrated by their own experience that they are able to move more tonnage than nine out of ten of the roads in the United States have to do.

The relative cost of roads of three feet gauge, and of four feet eight and a half inches, is about as six is to ten. This being so, the cost of a road from Denver to the City of Mexico would be from \$20,000,000 to \$25,000,000 less with the narrow gauge than with the ordinary width; and if it can do the business, as unquestionably it can for many years to come, here is the interest on that large sum saved, together with about the same per cent. on the saving in dead-weight.

Moreover, as Mexico has no railroads worth speaking of—only about 200 miles in the whole country—the *entrée* of the Rio Grande road will be very likely to establish three feet as the national gauge of that country. Thus it will probably be the inauguration of a great system, and one exactly adapted to the peculiar features of that vast table-land, with its scattered mountains and numerous defiles. But both the men and the money to build up that system and regenerate that naturally

grand, but socially miserable country, must flow in over this great pioneer road. In that lofty region, where there is neither winter nor tropical summer, the northern constitution would not become enervated; for, where wheat can be grown, the highest civilization and energy can be maintained.

In this thing we can see the dawn of a brighter day for poor distracted Mexico. New people, new ideas, new pursuits, and better objects of ambition will flow in, while a large and mutually advantageous commerce will grow up between that country and this. Thus the two countries will draw together until the time comes when it shall be thought best that one flag shall cover both. But let assimilation precede annexation. The grasping of outlying territory, merely for national aggrandizement, is a low, vulgar, barbarous ambition, and the more it is kept down the better; but to reach a helping hand to a suffering neighbor, to plant a true and progressive civilization in the midst of barbarism, to raise the fallen, cheer the faint, lead the blind, and exchange peace for chronic strife, is the true mission of a people so rich, so strong, so enlightened as ours.

In all this we have said nothing of the intervening territory of New Mexico, which has been ours by treaty for a quarter of a century, but which is to this day almost as non-progressive as old Mexico. This road will pass through its centre from north to south, and open up to the enterprise of our people its multitudinous resources. But other roads running from east to west, from Missouri, from Texas, and perhaps from intermediate points on the Mississippi, will soon reach it; and through them the great north and south line, of which we have been speaking, will greatly augment its trade and its importance. So New Mexico, with its wool, its wine, (said to be equal to any in the world,) and its metals, will add its quota to our national wealth and our internal commerce.

COUNTERFEIT WINE MANUFACTURE.

THE counterfeit wines for which Cette is principally noted are sherry, port, Madeira, Malaga, Cyprus, and Lisbon—the last a kind of sweet sherry. It also exports a large quantity of what is termed Burgundy port, principally to the United States, where it is used, mixed with an equally fictitious sherry, in the composition of the well-known sherry cobbler. Cette likewise produces counterfeit champagne, Alicante, Malmsey, Marsala, Sauternes, Hermitage, and Rhine wines.

During last year the exportation of imitation wines from Cette was close upon a couple of million litres, or nearly 450,000 gallons, which was equivalent to one-third of its total export of wine. A considerable quantity of the counterfeit wine of Cette is moreover consumed in France, more particularly sherry, Madeira, Malaga, and Cyprus, so that there is little doubt that this fraudulent trade produces considerably more than half a million of gallons annually.

It is some consolation, says the British Trade Journal, to find that the better class of counterfeit wines go to England, which takes "old crusted port" in large quantities, with a fair amount of "fine golden sherry," and also a moderate quantity of Madeira. The wines of an intermediate quality are reserved for Russia, Sweden, and the north of Europe generally—the first of which takes port, Madeira, Malaga, Marsala, and Lisbon; while Sweden and other northern states take Sherry and Malaga. The counterfeit wines of the lowest class—including the worst Madeira and sherry, the vilest champagne, the poorest Sauternes, the most worthless Rhine wines, Alicante, and Malmsey—are all specially concocted for the American market, New York receiving what no other place, save perhaps some of the South American States, would admit.

At Cette—next to Marseilles the most industrious, animated, and prosperous town of the south of France—we were struck by the activity which was everywhere apparent. Half a score of omnibuses were awaiting the arrival of the train. The quays were encumbered with wine carts, discharging their loads for shipment, and at the bourse, which was being held in the open air, an immense crowd of *courtiers* and *negociants en vins* were largely dealing in newly distilled *trois-six* and this year's Roussillon.

We found such large producers of imitation wines as we called upon quite ready to accompany us through their cellars, and invite us to taste any of their samples; but they proved unusually reticent when any questions were addressed to them on the subject of the means employed to produce this transformation of wine which is a specialty of the industry of Cette. They all maintained that drugs were never had recourse to by respectable firms, who, moreover, they said, employed no chemists in their establishments; although it was quite true that there were certain dishonest houses—there are degrees, it appears, in fraud—doing an insignificant amount of business, who had recourse to chemicals to produce different counterfeit wines. The judicious admixture of one natural wine with another, and the introduction of a small quantity of grape sugar or unfermented wine, which, by producing a new fermentation, renders the fusion homogeneous, supplemented by age or by exposing the wine in casks to the influence of the hot southern sun, were, accord-

ing to the manufacturers themselves, the principal means they employed. No doubt artificial heat also plays a prominent part in the business.

The wines of Roussillon, more especially that of Banyuls, are employed, it appears, in the manufacture of port, which seemed to be a very simple affair, consisting in nothing further than the introduction into it of a considerable quantity of brandy—as much as from 15 to 21 degrees of spirit being added. The doctored wine has, however, to be kept three years before it is entitled to rank even as young port. The samples we tasted were of the brewings of 1867, 1865, 1861, and 1860, and we must confess to a perfect familiarity with the beverage, having met with it frequently at public dinners, besides at scores of provincial hotels. It was the same with the five years' old sherry, made from a dry white wine of the south, and rendered golden by the innocuous admixture of a little caramel, and which, although it had been brandied to the extent of 50 litres of “trois-six de Montpellier” to each butt of 500 litres, was less fiery than much of the sherry drunk in London. We had begun with this wine, and then turned to the port, which, after the exploded English fashion, we followed up with the claret. The only wine of this kind, however, offered us to taste proved to be a diluted St. George, one of the Montpellier wines, which seemed a very fair ordinary wine for palates already depraved by the products of Portugal and Spain.

We noted down a few prices of these transformed wines. Port, the staple commodity, ranged from 475 to 550 francs the pipe of 533 litres—only 18 cents the pint, or 20 cents the bottle—and yet we observe from the price-list of a Marseilles firm now before us, that it can be bought as low as 300 francs, or at the rate of less than 12 cents the bottle, against 800 francs demanded for the genuine wine. Sherry, which, warranted five years old, was 450 francs the butt of 500 litres at Cette, is offered, without any guarantee as to age, at Marseilles at 300 francs, against 900 francs demanded for pure Xeres. Madeira at Cette was from 450 to 550 francs the butt of 460 litres, while at Marseilles it is precisely the same price as the port. There was very little difference in the price of the Malaga, which was 450 francs at Cette and 430 francs at Marseilles. This wine, it may be remarked, had the peculiar flavor imparted to it from the goat skins in which it is transported in Spain, very successfully imitated at Cette. The counterfeit Sauternes, commonly sold at from 75 to 100 francs the pièce of 228 litres, but this year prices would rule 25 per cent. higher.

Whatever may be the sins the “fabricants de vins” of Cette are guilty of in the matter of sophistication, or, to use their own milder term, of “transformation,” they are very far from being the sole culprits. For instance, at what is termed the “Office Vinicole” of Paris—the same

establishment where the *Moniteur Vinicole*, the recognized organ throughout France of the producers and dealers in wines and spirits, is published—may be observed any number of foreign ingredients for "transforming" wines puffed in every number of the journal. Passing over Appert's "Pulvérine" and the "Poudres de Jullien," &c., pretended to be designed for the clarifying of wines, but which in reality "develop the predominating boquet" "ameliorate the too intense color of red wines"—that is, convert the cheap black wine of Cahors into trebly dearer Bordeaux—and "lighten white wines that have become yellow;" in other words transform a *petit vin blanc* of the South into Chablis or Sauternes; passing over these ingredients we find the "Sève-arome de Médoc," which obtained honorable mention, we are informed, at the exhibition of 1867, recommended for "the delicacy of perfume which it imparts to red wines, no matter of what origin," and a single flacon of which at 1f. 50c. is stated to be sufficient for a pièce of wine. One-twenty-fifth of a litre of the "Céranthique boquet" at 30f. the litre will, we are assured, "double the value of any pièce of red wine, by imparting to it alike age and boquet," which last, by the way, will "endure forever." The "Sève-arome de Bourgogne" converts, as its title insinuates, the commonest growths into the most delicious Burgundy, imparting to them both body and remarkable delicacy of flavor. The Office Vinicole, by the way, does not limit its attention to wines. It has, in addition, a number of preparations for the improvement of brandy; among others, the "Liqueur essentielle de Cognac," "which destroys," it states, in highly scientific language, "the empyreumatic flavors prevalent in trois-six de Marc, annihilates the sharpness of beetroot brandy, and ages and imparts aroma to both." Five francs' worth of this compound is sufficient, it appears, to transform twenty-two gallons of raw spirit, distilled from beetroot, artichokes, or the husks and stalks of grapes, into "fine champagne." Besides the foregoing, the special offspring of the Office Vinicole, the *Moniteur Vinicole* contains numerous advertisements of "Bouquets des Vins," "Sève de Sauternes," and other concoctions, which, as they are evidently very largely employed, it is to be hoped are as innocuous as they are pronounced to be efficacious.

THE DISORGANIZATION OF LABOR.

THE present attitude of thousands of discontented workmen in New York and other large cities, presents a picture by no means pleasing to contemplate. Combinations of craftsmen of all callings, are making a sudden demand for the curtailment of the hours of daily production. Demagogues, improving the situation for the advancement of themselves, hound on the multitude to revolutionary disorder. Chaos displaces the processes of industrial regulation, exerting a more destructive tendency than would be effected by a wide-spread commercial revulsion. Men have been diverted from their legitimate services in creating the common fund of needed supplies to the ignoble deeds of anarchic idleness. Instead of building up, tearing down is the order of affairs; and distrust and rancor have impeded the coöperative workings of employer and employé.

At the bottom of this state of affairs lie manifold and interacting causes by no means expressed by the assumption of a question having arisen between capital and labor. Between these two there is no issue. Prominently the present confusion is the outcome of a social change. The position of the craftsman has improved in value and power. Instead of as in former times the workman seeking the work, the work now seeks the workman. Once he asked leave to toil, now he can in a degree afford to refuse the once coveted opportunity. While we are glad to contemplate this as part of the advance which mind is working out in human conditions, we cannot but deplore the abuse and waste of the better time. We regret it as retarding the very forces which have benefitted the workman; as not only decreasing the average of personal wealth, but as obstructing the distribution of wealth. While there is strength enough left behind law to hold society together, these disturbances but crush the man of small means and enhance the wealth of the great capitalist. Many employers are in no sense of the word capitalists. Thousands of industrious and capable artificers throughout the land who have workmen in their employ, have as their sole capital their knowledge of and devotion to their respective callings, accompanied with the will and industry to rise. Temporarily submitting to a bare subsistence, they toil even more continuously, and submit to even greater self denial than the journeyman craftsman whom they employ. These are the men who are most directly struck by the strikers.

To every reflecting mind the further the present demand for two hours' daily idleness is considered, the more does it appear as a crime against society. It does not merely denote the cessation of persons from their work. Our labor is now a highly complex thing. It is made up of persons, machinery, appliances, resources. The cessation of the first is for the time the abandonment of the other elements of production. There is in Philadelphia, for example, machinery, steam and otherwise, equal to a working power of 500,000 men. The present proposition is to lessen the productive value of this power by one-fifth. It is a great programme of loss. The creative force of great investments, the resources of large establishments for making their contributions to the sum of human comfort are lost—lost to the community, though the investor, in the complication of prices, may find compensation, and even gain. Many of our most intelligent mechanics who have been reluctantly compelled to join in the strikes, recognize this fact, and the present emergency is contemplated by them with no little apprehension.

As to the operations of trades unions in promoting such destructive disturbances, various opinions prevail. These societies were doubtless formed at the outset from the most laudable motives. That they have failed to confer the benefits upon their members which they were expected to do, is a matter of record. That they may have proved useful in some instances we do not deny. But how non-visionary American operatives could be hoodwinked into identifying themselves with these protective associations, as at present misdirected, is beyond our ability to comprehend. The trades union now is the refuge of the drone and the incompetent. Its levelling socialism is the grave of individual aspiration. "Let the best man win," was once, at least the spirit of the independent American freeman. But no matter how inefficient an artisan may be—no matter how thriftless, careless, or lazy—if he is a trades union man, he must receive a compensation equal to that obtained by the most ambitious and conscientious workman. All distinctions of merit are wiped out. The most arbitrary rules governing members are enforced; and the prominent idea running through the whole organization is a senseless hostility against "the rich," forgetful that the really rich, as a class, have generally sense enough to keep out of the cares, anxieties, and risks of employment.

Of the right for artisans and others to combine for the protection and improvement of their interests, there is not even the shadow of a doubt. Such associations, if they could only be guided by principles through which the best interests of the members could be subserved according to desert, and the rights of others not trespassed upon, would receive the sympathy and encouragement of the entire community. But as

they are now managed, everyone outside their membership seems called upon, even in the simple discharge of his duty as a good citizen, to resist them.

Imagine a number of workmen belonging to a single trade. Among a specified multitude, men of all ages, temperaments, habits, and aims, are enrolled. Possibly a majority may be frugal, earnest, and conscientious toilers—eager not only to advance themselves, but firm in purpose to discharge their contracts with their employers faithfully and earnestly; such men are not generally content to remain for life in a position called subordinate. They have other objects in view, and entertain a laudable ambition to excel; and the hope at some future time to exchange their position from that of an employé to an employer fills their vision. This sentiment—this independence which may be styled peculiarly American—is one which deserves and commands respect. But against this, trades unionism is firmly set, and internationalism in its ultimate grasp aims but to bury the individual in the mass of employmentship. When a workman loses sight of future advancement, when he expresses contentment in always remaining in his position as a mere employé, having no ambition to advance, when he listens to the garrulous speeches of the intriguers who generally contrive to control societies composed of artizans, his object in life must be considered as a mere bauble, and his instincts must have been reduced to a level with those of the helots of ancient Greece.

In a true democracy countless examples are furnished of men who have risen to distinction from the ranks, and who, if they had been tied down by the arbitrary rules of these despotic societies, would never have advanced to distinction. Our Franklins, Harrisons, Winans, Mericks, Baldwins, and other distinguished craftsmen, would have lived and died unknown, had their genius been smothered by the wet blanket which mediocrity strives to throw over merit. This measure of intellectual and moral greatness, which is attempted to be imposed, is no less wise than the practice of the ancient Gallic monarch who tried to make his recruits conform to a uniform physical stature by either stretching on the rack, or shortening by amputation. The moral and mental agencies of labor deserve recognition as well as the corporal, and are far more effectually felt in the body politic.

It is a fortunate circumstance that these disturbances do not extend throughout the whole country. In our large cities they are severely felt; and their effect may possibly be to drive a liberal share of industrial enterprise away from the influences of crowded towns into rural locations. In New York this result has, in a measure, already been accomplished. In large cities the demagogic social disturber plies his

arts most industriously; and as constant turmoil is his harvest, it is his endeavor to foment all the tumult within the scope of his mischief-making disposition. It is in such places that labor reform puts on the caricatures of socialism.

One of the predominant misfortunes of our political system is that the foibles and weaknesses of masses of people are made the means with which their leaders carry out their own plans. If there is one thing which may ever lead thinking men to doubt the wisdom of our plan of government, it is the facility with which unscrupulous adventurers assume a sway over too credulous people, luring them on to a fancied improvement of their condition by picturing the imaginary wrongs under which they labor, and promising in case of their advancement, an immunity from the dreadful evil of earning a livelihood. Whenever strikes are in progress such harpies may be found, like the vultures hovering over the field of battle, ready to pick up what they may devour. With an affected regard for the thousands who toil for their daily bread, they stir up discord for the furtherance of their own ulterior designs; and are every ready to proffer a simulated sympathy with grievances which, but for their false representations, would never be supposed to exist.

We will not willingly think that the great body of our American workmen have arrived at such a stage of degradation that they will be blindly led by bushwhackers of this kind, though the history of the past few weeks seems to confirm the suspicion that such may be the case. It is to be hoped, however, that a second sober thought may induce our artizans to take a careful survey of the question, untrammelled by the declamations and class hatreds which are so often considered as arguments. It is a matter of vital importance not only to those whose hands bear their share in the toil entailed upon the man, but to the others who gather round the hearthstone. That the families of striking operatives (themselves in part workers) are now suffering the pangs of hunger, is a fact only too apparent. Thousands of helpless wives and daughters have been brought for the first time to experience the bitter trials of want. So long as our operatives will continue to put their faith in evil machinations, and support them by their aid and presence, will this unfortunate state of affairs exist. When they rise in their might and denounce the tyranny which puts the best on a perfect equality with the worst, then the triumph of the individual over the mass, of merit over mediocrity, will have been assured. Reason will then have assumed her sway, and passion and ignorance will have been driven to the wall.

MINING AND METALLURGY.

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SILVER mining in the Pacific States and territories has experienced the same vicissitudes that have at times been noticed in all other departments of economic geology. From the discovery of the Comstock lode—which may be considered as the era which inaugurated the search for silver in this country—to the present time, alternate seasons of excitement and success, of depression and distrust, have marked the epochs which have attended this branch of mining. The traditions which have clustered around the noted silver mines of Germany, Mexico, and South America, and the almost fabulous accounts of the wealth which these repositories of the precious metal have furnished, have lent special interest to discoveries of silver, and have served as a strong incentive to the prosecution of searches for the minerals which constitute its valuable ores. That the silver interest of this country is destined to occupy a position even above that held by gold, there can be but little doubt. It is a question even now, whether the aggregate production of silver bullion does not equal, if not excel, that of the more precious metal.

It cannot be denied that many millions of dollars have been squandered by capitalists and their agents in the search for silver, and in the exploitation of mines which have proved unremunerative. Probably, if a just and equitable balance could be struck between the money advanced from the East to explore and develop silver mines, and the bullion product obtained from those in successful operation, there would be but very little difference on either side of the account. But this is no argument against the great silver industry, which must be considered as one of the leading occupations of the country. That mistakes have been made; that gross frauds have been committed; that many insane schemes have been undertaken, cannot be denied. The record of the past ten years affords many examples of such hapless adventures. The lapse of even this short period—and with it the necessary concomitant of experience—have shown the reason of many of these mining failures, which have had their counterparts in other countries as well as ours. Among these may be mentioned that haste and impatience for dividends which appear to be characteristic of so many American ventures. Added to this has been a want of sufficient knowledge in selecting and opening lodes, and a deficiency of capital necessary to thoroughly develop even an ordinary mine, where the conditions of expenditure were not enhanced by remoteness from commercial centres. One great cause of failures in American mining has been a thoughtless impatience and desire for immediate results; and if these should be deferred, a want of faith in ultimate success. The proper opening and development of a valuable lode is no trifling matter. Heavy expenses must be necessarily incurred. In most instances a large amount of dead-work must be accomplished—a vast amount of exploration must be undertaken—before the true policy of working a mine can be determined. Patience and confidence above all things must be established. That many valuable mineral properties have been opened, partially explored,

almost successfully worked, and finally abandoned, the history of the past decade abundantly proves. The alternate seasons of elevation and depression in stocks of mines known to be valuable, afford evidence to confirm this fact. Idaho, Montana, Utah, Nevada, and California—and to carry the illustration further, even Mexico—can furnish countless examples of the injury wrought by insufficient capital, and that impatience of immediate results so characteristic of our people.

But a few months ago the entire Comstock lode could have been purchased at but a tithe of its present value. After working for months in barren ground, new *bonanzas* were discovered in several of the mines at a great depth from the surface, and explorations having revealed immense bodies of ore in sight, a great reaction ensued, and an excitement unparalleled in the history of mining succeeded. Stocks suddenly advanced from a few dollars per share to thousands; and as still greater depths were penetrated, the same flattering indications were held out. Nor were these discoveries restricted to the Comstock lode alone. In other localities the same favorable announcements have been made; and at no period within the past eight years has the attention of capitalists been more closely drawn to the development of our silver mines than now.

A review of the developments which have taken place on the Comstock lode since the time its mines were opened, shows that twenty-six of the companies operating on this vein have produced not less than \$180,000,000 in bullion, of which \$22,000,000 have been paid to their stockholders as dividends, while the assessments are stated not to have exceeded \$12,000,000. As an example of the great fluctuations in the price of silver mining stocks, it may be mentioned that the Crown Point mine paid four dividends of \$10 per share during the year 1870; and yet in November of that year the stock declined to \$2.50 per share, or \$30,000 for the mine. At that time, rumors were circulated that the mine had given out; but the company believed in sinking still deeper, when a body of ore richer and larger than any hitherto uncovered was found. It is estimated that in the *bonanza* thus discovered, the quantity of ore in sight is between \$30,000,000 and \$40,000,000. In April last, the stock advanced to \$1,000 a share, equal to \$12,000,000 for the mine, or \$30,000 per foot. In October, 1870, the shares of the Belcher company sold as low as \$1 a share, or \$10,400 for the mine. This company paid its first dividend—\$10 per share—in January last, when the stock rose to \$490, or \$5,096,000 for the mine.

In other districts silver mines are in better condition than in any part of their past experience. At Pioche, immense developments have been made in the Richmond & Ely and other well-known mines. Besides districts of Nevada, in Arizona, eastern California, Utah, and various mining localities, the discoveries which have been made, together with improved management and processes for extracting the metal, have served to bring this important industry into a degree of prominence worthy of its merits. An important feature of this movement—one which entitles it to no small confidence—is the absence of that reckless speculative feeling which characterized the mining projects of six or eight years ago. Under a more enlightened and sensible policy, and in view of the improvement in the details of mining and milling ore, better results are to be hoped for than those which formed the rule rather than the exception when speculation held its rampant sway, and when operations at mines were made subservient to corners in speculative monetary centres.

—REGARDING the famous Emma mine, Prof. Silliman made a statement at the last meeting of the American Institute of Mining Engineers, to the effect that since 1871 great progress had been made in the work of exploration of the mine, which has revealed the fact that the ore-mass is continuous both in depth and extent, so far as the investigations have been pursued. In depth, two winzes have been sunk in ore, one near the old whim-shaft to a depth of about one hundred feet below the lowest of the old works, and another about one hundred and twenty-five feet north-west of the first, and quite beyond the former known limits of the ore, which, on the first of April, was over one hundred

and thirty feet below the adit, and all the way in excellent ore. Both these have followed a well-defined foot-wall, marked by evidences of motion, and not without a distinct selvage below the ore. In the second named, driving south-east on the level of the sixteenth floor below the adit, the ore was found of equal value to the best average of the mine, the end yielding silver \$1,995, and about 80 per cent. of lead, while the sample gave \$480 and \$500 per ton. A cargo sample from these deepest explorations gave \$219 in silver, and about 30 per cent. of lead.

Further explorations on the seventh and eighth floors of the mine have revealed the existence of great bodies of rich ore, and have gone far towards furnishing the daily demands for shipments of ore without impoverishing the old reserve, and without stopping out in the new ground; and while the exact amount of ore thus revealed has not been estimated, it is probable that at least a two years' supply exists. The policy of the management of the mine is to employ the force almost exclusively in opening up new ground, wherever the ore may lead them, leaving it for the most part, standing, beyond the actual limits of winzes and drifts, and the demands of the day.

Concerning the geological character of this remarkable mine, Prof. Silliman is of the opinion that it is situated upon a great mineral belt or ore channel fully mineralized, and giving the strongest evidence, in its brecciated character, in angular and laminated fragments of the country rock torn off and pasted into the ore-mass, in the continuous foot-wall striated by mechanical motion, and faced by a well-founded selvage, and in the extensive alteration and decomposition of the associated minerals, that it will prevail to a great depth and extent. While not exactly affirming the opinion that it is a true fissure vein, in the strict acceptation of that term, yet the evidence it gives of being a deposit of remarkable value and persistence is of the most distinct and positive character. The gangue of the Emma mine rarely shows any crystalline quartz, while cargo samples of the ore have been proved to contain over 40 per cent. of silica diffused in the mass in the form of an impalpable powder. The refractory character of the Emma ores is thus accounted for. At first it was believed that this silica might have been derived from the limestone, which is often friable and granular, and seemingly siliceous: but on analysis this rock proved to be nearly free from silica, and a true dolomite. The conclusion was then adopted that the silica was an original and integral factor of the ore-mass, and that further exploration of the vein might yet reveal the existence of crystalline quartz. The friable nature of the veinstone renders mining in the Emma mine a very easy task. Only fourteen miners are employed in all descriptions of mining, and the average cost of raising the ore has not yet exceeded 8 per cent. of its gross value—all expenses included.

—SPIEGELEISEN is meeting with so largely increased a demand in consequence of its application in the Bessemer process, that spathic iron ores, from which it is made, have assumed a greatly enlarged importance. In England a lode of this ore has been recently worked near the old Treburgett mine. It is said to be from seven to ten feet wide, and to furnish ore of unusual purity. An analysis of the product of the mine has been made by Dr. Toash, F.C.S., as follows:—

Protoxide of iron	88.54	
Protoxide of manganese	16.69	
Alumina	1.86	
Lime	8.69	
Magnesia	0.89	
Phosphoric acid	0.15	
Iron pyrites	1.60	= 0.85 sulphur.
Siliceous matter	8.69	
Carbonic acid	85.09	
Copper	trace	
	—	101.06
Metallic iron, per cent.	Raw. 26.84	Calculated. 37.36
Metallic manganese, per cent.	12.92	18.00

Dr. Tosh expresses the opinion that the sulphur in this ore exists in such a form that it may be readily expelled by calcining, a process which spathic ores are always subjected to before smelting.

There is a valuable deposit of spathic iron ore in the town of Roxbury, Conn., which was examined by the writer in 1864. On this property there are several well-defined veins, the principal one of which had at that time been explored by means of trial pits and open cuts for a distance of seventeen hundred feet. A shaft had been sunk upon the vein to a depth of twenty-one fathoms, where its thickness was six feet. The body of solid ore was very large, the gangue consisting chiefly of quartz. Since our visit to the locality the mine has been worked, but with what success we are unable to state. Our analysis of an average sample of the ore was as below:—

Protoxide of iron.....	54.93
(Yielding metallic iron, 43.73)	
Oxide of manganese.....	1.99
Lime.....	1.90
Magnesia.....	traces
Silica.....	2.12
Carbonic acid.....	86.22
Water and loss.....	2.84
	<hr/> 100.00

The steel manufactured from this ore was of the most beautiful description. It was fashioned into knives, razors, shears, and other cutting tools, which were pronounced by experts to excel in quality, while the ease with which the ore was smelted was largely in its favor. This locality has always possessed great interest among mineralogists on account of the beauty of the cabinet specimens it has furnished.

—THAT North Carolina is destined at no very distant day to occupy a prominent position as a producer of iron, is a matter which admits of easy proof. A few months ago we alluded to the immense deposits of titaniferous iron ores known as the Tuscarora and Shaw ore belts, situated in the counties of Guilford and Rockingham. These localities are attracting great attention both from the abundance and purity of the ores, and from the economical advantages of their location. In Yadkin county, deposits of black granular magnetite have been recently discovered, which promise to be of great importance. These mines, which are known as the Hobson iron mines, have been already partially developed. Dr. F. A. Genth expresses favorable opinions as regards their value, and says: "The ore in all the ore beds is a black granular magnetite, sometimes a little rusty from the oxidation and hydration of a small portion of the same. This is more or less mixed with silicates, such as actinolite, epidote, &c., and occurs in large beds in talc-micaceous slates. There are several parallel beds coinciding in strike and dip with those of the enclosing rocks." At this locality there are three openings known as the Upper bank, the Nicholas Hobson tract, and the Shields bank. At the first of these openings the depth of the main shaft is eighty feet, fourteen feet of which is in the solid ore, which has not yet been pierced through. Several other shafts have been sunk upon it, which prove the bed to average from eight to nine feet in thickness. On the Nicholas Hobson tract the deposit of ore varies from five to ten feet in thickness. The Shields bank contains three beds of ore, which have been explored by several small shafts. From one of these beds a variety of ore is taken, called in the neighborhood "steel ore," because of the character of iron which it produces, and which for hardening picks, plows, axes, &c., is pronounced by local blacksmiths to be almost equal to blister steel. One of these beds is very large, attaining a thickness of twenty feet and upwards.

The ores from these localities have been analyzed by Dr. Genth. They contain from 40.46 to 67.79 per cent. of metallic iron, while their content of injurious impurities, such as sulphur, phosphorus, and oxide of copper, is exceedingly small—many of the samples

containing none whatever. From the mode of occurrence of these beds it is probable that the quantity of ore is practically inexhaustible; while its high quality and the increasing demand which exists for ore of this kind must soon cause the development of a prosperous metallurgical industry.

—BISMUTH is one of those rare metals having many useful applications in the arts, which have been hitherto restricted to but few localities. Although specimens of bismuthine—a sulphuret of the metal—have been found in many parts of the world, it is not met with in sufficient abundance to be classified among ores. The native metal, which occurs in foliated masses and scales, as well as in reticulated and arborescent forms, is the chief source from which the bismuth of commerce is derived. Its principal localities are in Saxony and Bohemia, in the Erzgebirge range of mountains. These mines have become so nearly exhausted that, even with no increase in the demand, a growing scarcity has been felt; but this demand is increasing very largely, and, as a consequence, the price of the metal has advanced in great ratio. It is said that discoveries of native bismuth have been made in Utah, in the town of Beaver, about two hundred miles south of Salt Lake City, and if the accounts which have been given of the existence of the ore are reliable, they are destined to attract no small share of attention. The deposit is said to be very extensive, and a well-defined lode seven feet in thickness is reported to have been traced for a distance of more than twelve hundred feet. If these assertions be true, this discovery is a matter of great importance. The metallurgical treatment of the native bismuth is very simple. According to Makins, the ores are placed in tubular iron retorts arranged in a horizontal row, slightly inclined from the upper to the lower end. Heat is applied to the exterior of the retorts, when, in a few minutes, the metal begins to flow. A small rake is thrust into the end of the retort, and the heated ore stirred, which promotes a more rapid flow of the molten metal, which runs into iron dishes, where it is protected from the oxidizing influence of the air by a covering of powdered charcoal. In this manner a charge of a series of retorts, holding fifty-six pounds each, may be worked off in less than an hour. When no more metal runs off, the siliceous matrix is raked out of the upper end and allowed to drop into water, when the retorts are recharged and the operation continued. This Utah deposit is the only bismuth mine which has yet been discovered in this country, and it is to be hoped that the reports concerning it may be well founded.

—THE mineral resources of Texas have been recently described by Prof. A. E. Roessler, who seems to have paid much attention to the economic geology of the State. Alluding to the coal-bearing rocks of Texas, he remarks that they occupy an area of not less than 6,000 square miles, embracing the counties of Young, Jack, Palo, Pinto, Eastland, Brown, Comanche, Callahan, Coleman, and extending to the territory of Bexar. The rocks contain the characteristics belonging to the coal measures of Missouri and other western States. In general the appearance of this coal resembles that from Belleville, Ill., and shows by analysis:—

Fixed carbon.....	52 per cent.
Volatile matter.....	36 “
Ash.....	8 “

But the above analysis, we must remark, is incomplete—as the total ingredients foot up but 91 per cent., instead of 100, as they should do.

According to Prof. Roessler, the coal cokes with a great flame, without changing in form, and the development of this mineral is destined to be of the greatest value to the State. Anthracite coal—lighter and more brittle than the anthracites of Pennsylvania—has been found in various parts of the State. Lignites and other coals of a more recent origin occupy an area of about 10,000 square miles on many points of the Rio Grande, in Webb, Atascosa, and Frio counties. They are mostly soft, sulphurous, and ashy, but superior to the German brown coals. Besides the localities mentioned by Prof. Roessler,

there are coal mines in Navarro county, where two mines have been opened and the product successfully used upon a railroad.

—At a recent meeting of the London Chemical Society, Mr. Riley read a paper on the manufacture of iron and steel, in which he advanced some very remarkable views—among others, intimating that phosphorus exerts a beneficial effect upon iron. This view is so diametrically opposed to the experience and opinions of the great body of chemists and metallurgists, that we are sometimes disposed to question the accuracy of the report of this meeting, which we find in Nature. But as the technical information given by this periodical is uniformly correct, we must accept the faithfulness of the reference to Mr. R.'s paper. A very important effect on the quality of iron is also awarded to silicon, and the author states that Swedish ore, which contains very little silicon and no phosphorus, when used by itself, gives red short iron. Whatever may be the premises upon which Mr. Riley founds his theories, they will receive but little endorsement from ironmasters; and however plausibly he may advance his views, it is safe to assert that practical experience and profound scientific research have alike indicated the extremely deleterious effect exerted by phosphorus when existing in sensible quantities in iron.

—THE kingdom of Bavaria occupies but a minute area on the map of Europe; but notwithstanding its diminutive size, it possesses a large number of productive mines and metallurgical establishments. The statistics of 1870 show that out of 746 mines, 265 were in actual operation, the gross mineral product being 512,910 tons, raised by 4,370 miners, and valued at upwards of \$12,000,000. The minerals consisted as follows: Coal, 861,808 tons; lignite, 81,504 tons; ironstone, 97,030 tons; iron pyrites, 1,966 tons; graphite, 680 tons; ochre and paint, 1,031 tons; china clay, 2,206 tons; fire clay, 13,998 tons; soapstone, 229 tons; corundum, 68 tons; fluor spar and barytes, 1,565 tons; slates, 1,500 tons; and gold to the value of \$5,000. In the iron-works there were produced 48,968 tons of pig-iron; 11,633 tons of castings; 60,278 tons of bar-iron, and 1,799 tons of sheet-iron. The largest iron-works are those of Maximilian's Hutte, near Regensburg. Although large quantities of hematite and oolitic iron ores occur in Bavaria, their further development is retarded by the want of a sufficiency of coal, a large portion of which must be imported from Westphalia and Saxony.

—FIRE-DAMP explosions in coal mines have been hitherto chiefly restricted to bituminous and cannel coal fields, while anthracite mines have been exempted from the fearful accidents so common in other mines. But lately a terrible accident which occurred in an unemployed mine near Wilkesbarre, shows that danger is to be apprehended in a branch of mining heretofore supposed to be exempted from liability to catastrophes of this kind. Even in bituminous coal mines this country has hitherto shown a record comparatively free from the casualties so common in European mines. In the accident referred to, three engineers, who were engaged in surveying the mine, were killed, while a fourth narrowly escaped injury. This disaster has directed attention to the subject, and calls for decided action to determine the probable occurrence of explosions in mines and districts heretofore supposed to be exempt from danger. In the American Gas Light Journal it is suggested that a scientific commission be created to investigate the subject of the safe lighting and ventilation of mines, and the application of the newest discoveries thereto.

—A NEW apparatus for detecting the presence of fire-damp in mines has been recently introduced in Germany, which is thus described: It consists of a bell actuated by clock-work, the striking motion being checked by an unevenly balanced arm, the lighter end of which is held by a cotton thread saturated with saltpetre. The apparatus is placed in a wire gauze cage. The fire-damp, when it occurs, penetrates with the air into this cage, and quickly ignites from contact with the flame of a lamp burning within, and, as a necessary consequence, burns the thread, setting free the balanced arm which checks the bell, which then rings the alarm. This device seems simple, and may be easily tried.

—AFTER many fabulous reports of tin ores existing in workable quantities in America, we have at length an authentic account of the occurrence of beautifully crystallized tin-stone, or cassiterite, which was discovered a few months ago on the northerly shore of Lake Superior, near Neepijon bay. At a recent meeting of the Lyceum of Natural History of New York, our friend, Prof. Henry Wurtz, exhibited some beautifully crystallized specimens of this mineral, which is described as existing in large quantities strewn over the surface of the ground in the shape of boulders, which occur over a long extent of land. An analysis by Dr. John Torrey, of the United States assay office of New York, proves the samples to contain 88.3 per cent. of metallic tin. We shall look for further developments from this vicinity with great interest. The known mines of tin are restricted in locality and decreasing in production.

—SIEMENS's regenerative furnaces, which have been so completely successful abroad, are being gradually introduced into this country, where they have given the same satisfaction as has attended their use in Europe. Some time ago one of these furnaces was erected in the Crescent steel works of Pittsburgh, which from the start operated so admirably that an additional one has been built, the capacity of the two being twelve tons of steel per day. According to a local paper, the quality of the metal produced by the Siemens process is of such excellence as to tax the capacity of the works to supply the demand, and it is probable that further extensions will be required. From a very insignificant beginning this establishment has grown to be one of the largest works in the country—a fact which will perhaps induce other manufacturers to examine into the merits of Mr. Siemens's admirable invention.

—CALIFORNIA papers announce the discovery of a body of coal near Santa Rosa, in Sonoma county, which is said to possess the qualities of the best bituminous coals of England—although this statement must be received with some grains of allowance until more extended tests of its properties can be made. It is said to coke well, and to produce an intense heat when burned. As no very extended geological examination of the locality has been made, it is, of course, impossible to form an opinion of the extent of the bed or its economical relations. The ordinary lignite of California occurs within a short distance of this reported coal vein. If the reports of its occurrence should be verified, it will be no less interesting than important to the people of that State.

—FROM the Portland Oregonian we learn that several specimens of lead ore discovered near the foot of the cascades, in Linn county, in that State, have been assayed and found to contain 60 per cent. of lead, with "a very fair proportion of silver." The opening from which the specimens were obtained is known as the Washington lode. Steps have been taken to commence mining operations at once, a joint-stock company having been formed. In the vicinity of Tillamook, discoveries of lead ores have likewise been made, which are said to be very extensive.

—It is said that quicksilver ores in considerable quantity have been discovered near Austin, Texas.—AMONG other announcements of mineral wealth in Utah, reports reach us of the discovery of large bodies of sulphur. The deposit is said to occur in the Beaver mountains, 300 miles from Salt Lake City.—PROF. PUMPELY, the State geologist of Missouri, is in the field in the south-eastern part of the State, having his headquarters for the present at Arcadia.—DURING 1871 the total product of the iron mines at Iron Ridge, Wisconsin, amounted to 82,284 tons, of which 75,842 tons were transported to Milwaukee by the northern division of the Milwaukee and St. Paul railroad, while the balance was converted into charcoal pig at the Wisconsin Iron Company's furnace at the mines. Of the above quantity of ore which was forwarded to Milwaukee, 29,285 tons were shipped to Chicago, and 5,430 tons to other points.—THE high price of fuel in Utah is a serious drawback on the prosperity of smelting works. At some furnaces charcoal has brought thirty cents per bushel. At this rate the metallurgical treatment of even rich argentiferous ores is a very expensive process.

INSURANCE.

BY appointment of President Grant, Hon. William Barnes will be one of the three official delegates from the United States to the statistical congress meeting at St. Petersburg August 22d. This recognition of the merits of Mr. Barnes as a statistician we record with pleasure, but are more gratified to think that such appointment not only testifies to special ability, but will serve a great practical purpose in regard to the interest with which Mr. Barnes is most prominently identified. The most thoughtful years of his life have been passed in the study of insurance—the bearings of its principles, known or assumed—the compiling and systematizing of its data. He entered upon the subject, not to make merchandise of it, but impelled by those irresistible influences which cause men to pursue a favorite object, even at their personal cost. Placed at the head of the New York insurance department, he entered upon his duties under circumstances calculated to give preference to the mere detective work of the office, but the policeman soon became subordinate to the economist. He asked many questions, much to the anger and bother of insurance officials, but he did not ask in any spirit of officiousness or oppression, nor as the preliminary of any extortion; he simply inquired to ascertain whether practice agreed with rules which—whether correct or not—he thought the best safeguards yet devised, and if not so, the merits or demerits of both practice and rules could be tested. Knowing that the attempt to regulate the administration of insurance must be in great part a failure where the basis of proper regulation is so largely unknown, he made the department first and foremost a statistical bureau, that out of the gathered experience might come the rules of safety—figures being the facts of underwriting, the measure of all practice—whether correct, incompetent, or fraudulent.

Instructed by the statistic side of insurance, Mr. Barnes will meet at St. Petersburg the men who note all the happenings of individual and social life; who note the fate of man and his works; who, from the systematized record, would learn the laws which hold in subjection the benefits and detriments of life; who would know how to live better and more safely by living more wisely. Over large areas of occurrences insurance has set its measuring lines and angles. It has largely observed and noted some specific forms of human disaster: it professes, in respect to them, to have approximated to the ratio of occurrence to liability; to have struck, practically, the probability which lies in possibility; to have neared the average which demonstrates the law. It has made its claims a verity by application to the affairs of life with definite results. It has provided compensation for breaks or deficiencies in absolute safety, and through this has conserved wealth and aided production.

Now, we think it is nearly time that insurance, as an economic force, should be understood, or at least, that as such, something should be known about it. It has always been merely a side matter with that kind of political economy which acts on general principles, disregarding detailed facts. A proper representation of the subject at St. Petersburg ought to define in some degree the position of insurance in its relations to the circle of subjects which come up before the body—define it as an individual concern, as a social

concern, as a political concern. It is ahead of all the economic systems in statistic application. It first set in motion the machinery of financial restitution. It adjusts law to law. Its fundamental idea of averaging loss to the mass of liable subjects lies at the base of the equilibrium of society, which it is the aim of sociology to develop and work out. A simple conception, reached, however, by ages of thought, illustrates the mental attitude of the most advanced thinkers of the time. It is this: Whether Vesuvius flames, or a cottage burns; whether a Caesar's gashed to death, or a sparrow falls, one event is just as natural as the other: and on this line of judgment insurance has traversed from its beginning.

If Mr. Barnes can give indices to the utilities of insurance, as it permeates social elements, he will serve his cause well by directing towards more accurate interpretation of it from without its circle. From this must come better, because less ignorant treatment of it by peoples and legislators—the interpretation beginning with those capable of thinking. With less annoyance and obstruction from without, improvement from within will be less impeded.

A great point will be gained when communities can be brought to appreciate one-tenth of the interest they have in the subject of insurance—even the interest which is distinct from the direct fact embraced in each policy. If we take, for example, life insurance as the conversion of savings into productive capital, *working accumulatively*, or life insurance as an increase of personal power in business—i. e., the capitalist having so much secured, can better afford to take the risk of organizing new production, direct or indirect—we have in either case a theme whose clearest and broadest demonstration is not only of great social advantage, but corrective of defects in insurance itself.

We have sometimes thought, when we have seen or known some self and selfishly-important fool snub some life solicitor, that it would be well if there could be unfurled the panorama of the sequences which follow mortal actions—if the sneers deterring the solicitor sent darkness into future lives, the picture might disclose such moral responsibility as would make contrition take the place of presumption. Mr. Barnes will draw his sequences in the city where Slavic civilization, emerging from the Scythian night, takes the hand of Europe's progress. The place is suggestive, and there in the midst of its suggestiveness may he do his subject justice!

—The third annual report (for 1871) of New Hampshire insurance commissioner, Hon. Oliver Pillsbury, is at hand. We cite from it a compend of the State business. The commissioner regrets that many of the insurance companies doing business in the State failed to file their annual statements in his office, within the time prescribed by law. In addition to this tardiness, excusable in some instances no doubt, the neglect of a large number of insurance companies of other States, particularly life companies, to answer the local questions relating to their business in the State, some pleading inability to do so, and others apparently ignoring these questions entirely, has been a source of much annoyance and labor. Obtaining answers to these questions has consumed a large share of the limited time allowed for compiling the report.

FIRE INSURANCE.

The amount of property insured in all home companies (all fire) is as follows:—

15 Town mutual companies.....	\$ 2,126,612 00
6 Mutual companies not limited to towns.....	12,886,845 78
1 Stock company.....	7,708,555 00

Total.....\$22,721,512 78

Losses reported during the year as follows:—

15 Town mutual companies.....	\$ 4,920 29
6 Mutual companies not limited to towns.....	17,427 80
1 Stock company.....	17,696 10

Total.....\$40,044,19

Loss to amount insured equal to about eighteen cents per one hundred dollars for the year. All except two of the mutual companies show an increase of indebtedness during the past year. Some of these debts have been eight or ten years accumulating. The question now naturally arises, who is to pay them? The present policyholders certainly are not liable for these ancient debts, and it will be likely to require severe persuasion to collect them of persons whose policies expired long ago. This is a question of some concern to the creditors of these companies, if not to the present policyholders.

The town mutual fire insurance companies exhibit a marked improvement generally upon similar statements of the previous year, which were the first ever made, showing that the business has been more carefully looked after in anticipation of the account to be rendered. We regret to say, however, that the losses reported the past year have been quite heavy in comparison with the amount of property at risk.

The losses and running expenses amount to \$5,614.52, which indicates that the cost of insurance upon the \$2,126,612 at risk, has been a fraction over twenty-seven cents per one hundred dollars for the year. We have not included in this estimate the cash paid on taking out policies for the reason that the rates are not uniform in the several companies. This would carry the expense nearly if not quite up to thirty cents per one hundred dollars for the year. We confess to much surprise at the result of this calculation, and must be allowed to suggest that it does not argue in favor of an increase of this class of insurance companies, while it is well known that this same line of risks may be readily insured in first-class stock companies, on four or five year policies, for from twenty to twenty-five cents per year on one hundred dollars.

The largest loss reported is but \$1,800, whilst most of the companies insure \$2,000 or upwards in a single risk. More favorable results, therefore, in the future cannot reasonably be expected, while a loss of a single one of the largest risks allowed by these companies, an event by no means improbable, would require assessments upon the premium notes of the several companies, varying from 15 to 49 per cent. Surely insurance that carries this risk upon it ought to possess the element of absolute safety.

The total premium receipts reported for the year 1871 on fire and marine risks in the State written by companies of other States licensed to do business, was.....

\$447,173 21
871,739 67

Total premium receipts reported for 1870.....

Increase..... \$75,432 54

Total amount of losses paid in the State in 1871..... \$280,181 08

Total amount of losses paid in the State in 1870..... 854,441 06

Less in 1871, than in 1870, by..... 124,809 98

The aggregate of all the risks carried by insurance companies of other States licensed to do business in this State, as reported Dec. 31, 1871, was..... \$42,289,749 37

Aggregate of risks carried by all home companies..... 22,721,512 78

It may be remarked here that there is a large amount of property in this State insured by companies of other States that do no agency business. These contracts are affected directly with the home offices. Most of the manufacturing, as well as a large share of other incorporated property, is insured in this way; consequently we have no account of it in this department.

From the above it will be noticed that the losses paid during the year 1871 in this State, by licensed companies of other States, amount to a fraction over 51 per cent. of the premium receipts. This shows a decided improvement in favor of the insurance companies on the business of the preceding year.

LIFE INSURANCE.

During the year 1871 the Globe Mutual Life, of New York city, the Republic Life, of Chicago, and the Vermont Life, of Burlington, Vt., were admitted to do business in this State, although the two first named did not apply for renewal of license April 1st, therefore they are not authorized to issue policies at this time.

During the same period the Homœopathic Life, of New York city, has withdrawn, and the Amicable Life, of New York city, has reinsured its risks and ceased operation. The United States Life, Craftsmen's, and New York Life, all of New York, have ceased to solicit new business in this State.

The whole number of companies authorized to do business in this State at the present time is 84; whole number of policies issued in the State in 1871, 1,771; amount insured by same, \$2,859,785; whole number of policies now in force in the State, 10,103; whole amount of premiums received on same in 1871, \$697,194.59; whole amount of losses paid and endowments in 1871, \$133,968.96; whole amount of premiums received in 1870, \$722,325.47; whole amount of losses paid in 1870, \$101,639.47.

This shows a falling off in the aggregate of premium receipts in 1871, as compared with 1870, of \$25,130.88, and an increase of payments of \$32,329.49. Several companies heretofore quite active have made but little effort to obtain new business, or even to hold that already obtained, having no active agents in the field, probably for the reason that agents have not found it so easy to make it pay as formerly. Companies, generally, that have continued to occupy the field vigorously, have kept up their business, while several show a marked increase over former years.

The following columns give State business, the number of new policies issued, with the amount insured thereby, in 1871, and losses paid in the year by life companies doing business in New Hampshire:—

	<i>New policies.</i>	<i>Amount insured.</i>	<i>Losses paid.</i>
Etna.....	44	\$92,680 00	\$19,760 81
American Popular*.....	..	.....	.....
Asbury.....	..	.....	1,000 00
Atlantic Mutual.....	..	.....	.....
Berkshire.....	..	.....	.....
Charter Oak.....	66	85,800 00	10,500 00
Connecticut Mutual.....	20	86,500 00	8,200 00
Connecticut General.....	1	1,000 00	.....
Continental, New York.....	164	242,000 00	.....
Continental, Hartford.....	175	203,800 00	7,633 33
Craftsmen's†.....	..	.....	700 00
Eclectic.....	84	88,100 00	.....
Economical.....	..	.....	.....
Empire.....	..	.....	.....
Empire State.....	5	8,000 00	1,500 00
Equitable, New York.....	20	93,000 00	.....
Guardian.....	30	33,200 00	.....
Hartford Life and Annuity.....	23	40,000 00	.....
Home, New York.....	1	2,000 00	.....
Homœopathic.....	5	6,000 00	.....
Hope.....	8	14,000 00	.....
John Hancock.....	17	19,500 00	7,000 00
Manhattan.....	4	11,295 00	3,086 00
Massachusetts Mutual.....	293	408,335 00	31,500 00
Mutual Life, New York.....	44	44,500 00	9,630 00
Mutual Benefit.....	28	60,050 00	14,000 00
National, New York.....	..	.....	.....
National, Vermont.....	10	26,000 00	2,000 00
National, Washington, D.C.....	10	9,334 00	5,500 00†
New England, Boston.....	9	19,000 00	.....
North America, New York.....	3	1,750 00	1,000 00
Phoenix, Hartford.....	302	428,300 00	4,500 00
State Mutual, Mass.....	7	7,500 00	.....
Travelers'.....	391	357,451 00	45,881 00
Universal, New York.....	..	.....	.....
Union Mutual, Maine.....	42	51,800 00	6,000 00
Vermont.....	..	.....	.....
Washington, New York.....	..	.....	.....

* Policies in force, 6.

† Policies in force, 3.

‡ Premium receipts, \$2,323.96.

—LIFE insurance men feel the need of coöperation as well as the fire underwriters. Such controversies and detractions as were the outgrowth of the strife of flush times, now give way before the feeling that the common interest can no longer afford the contentions among members which have weakened and depreciated it. This is among the compensations which the hour of reverse brings. The sweet uses of adversity, by enforcing repentance, cause men to rethink and rebuild to better and more enduring purpose. If harmony should now take the place of discord; if solicitors, agents, and officers, instead of working *against* the general interest, were from this time forth to work *for* it; if there were a great, strong, united action in behalf of life insurance *per se*, by the active, effective men connected with it—men who do not work without results—action which should be for the general good, not for account of this company or that, what a turn there would be to the ebbing tide! If an emergency has arisen, the forces are at hand by which it is to be met and overcome. If the time is depressing, lift off the pressure by the indomitable will which first conquered the perverse rejection of life insurance, and last year alone, over 8,000 families, bereaved and otherwise desolate, blessed the work of the purpose which would not be thwarted nor turned aside. These blessings must descend forevermore. In the past, the successes of life insurance were born of the endurance of the workers in the field: if that endurance has been enervated by easier opportunities, let it be renewed by the demands of the more rigid occasion, and in rightful resolve and rightful labor bear the great economy onward to a yet more golden and more beneficent history.

Nor sit we down and say
There's nothing left but sorrow;
We tread the wilderness to-day—
The promised land to-morrow.

—THE life insurance agents, &c., of Hamilton county, Ohio, and Campbell and Kenton counties, Kentucky, associate under the title of the Life Underwriters' Association of Cincinnati and Vicinity. The purpose of such an organization is a good one, and such union at this time needful; but in the defining article of the constitution there is a fierceness of ridiculous metaphor which puts a front of absurdity upon the whole thing. Article 2 reads thus:—

Article 2.—The objects of the association are to maintain the honor and dignity of the business of life insurance, to cultivate social intercourse and acquaintance among the members of the profession, to increase their efficiency in the business, and to rid the profession of those leeches that prey upon the earnings of other and better men.

Gentlemen, if you will mix your liquors, take your metaphors straight; and don't, in your zoölogical transformations, exceed even the geneses of Darwin. Somebody might put a leech preying upon the *earnings* of other men on exhibition as a specimen of your creative genius.

—WHAT are called fire extinguishers are useful when the men to apply them are about and the opportunity accords with the instrument; that is, when a fire is discovered before it has spread, the extinguisher is an improved bucket of water; and if the man is always on the alert for the occasion which calls for the extinguisher, the extinguisher is an admirable invention, even if it will not work when wanted. We notice that of one English patent 18,000 have been sold in Great Britain in the last six years, and the testimony shows that the invention has operated somewhat as an incentive to an increased precaution against fire, apart from whatever superiority there may be in Dick's portable engine as a fire extinguisher. We should always look for a more timely suppression of fire on the premises where such, or an equal, precaution is found, but do not deem it of very particular service when merely the badge or advertisement of a carefulness which does not actually exist. Anybody who will invent something to reduce the ugly figures of our fire loss, will show such a power and reality of extinguishment as will cause insurance men, at least, to rise up and call him blessed.

— We cite from the Chronicle the following table, showing the risks taken, premiums received, and losses paid in Illinois during 1871 by the life insurance companies of Illinois and other States, doing business in Illinois, including the two Chicago coöperatives:—

	<i>Risks taken.</i>	<i>Prem. rec'd.</i>	<i>Losses paid.</i>
Ætna, Hartford.....	\$1,629,804	\$335,908	\$ 96,863
Atlantic Mutual, Albany.....	104,500	11,949	4,000
Asbury, N. Y.....	882,533	10,246	10,000
Anchor, Jersey City.....	126,272	8,400	4,000
Brooklyn, N. Y.....	91,500	6,609	5,000
Berkshire, Pittsfield.....	168,000	12,690	1,000
Charter Oak, Hartford.....	1,284,675	252,694	45,700
Continental, Hartford.....	130,200	3,923	.....
Connecticut Mutual, Hartford.....	1,490,250	695,065	137,561
Continental, N. Y.....	500,000	59,292	7,500
Craftsmen's, N. Y.....	58,000	3,362	5,000
Chicago, Chicago.....	773,944	63,209	3,500
Covenant Mutual, St. Louis.....	168,500	8,776	.....
Equitable, N. Y.....	1,266,000	268,959	80,000
Eclectic, N. Y.....	862,000	37,154	7,000
Empire, N. Y.....	745,000	9,908	3,500
Guardian, N. Y.....	863,080	55,475	3,000
Germania, N. Y.....	213,832	66,745	32,032
Globe, N. Y.....	446,113	95,246	16,500
Government Security, N. Y.....	84,000	895	.....
Home, Brooklyn.....	179,700	37,711	16,000
Hope Mutual, N. Y.....	249,500	14,468	2,000
Hartford Life and Annuity.....	814,784	30,598	12,100
International, N. J.....	124,500	2,361	.....
International, Chicago.....	51,263	11,999	1,000
John Hancock, Boston.....	403,250	14,083	3,000
Knickerbocker, N. Y.....	181,800	39,830	34,253
Mutual, N. Y.....	1,389,797	550,731	85,500
Mutual, Chicago.....	1,201,400	108,737	15,500
Mutual Benefit, Newark.....	374,850	98,972	35,000
Massachusetts Mutual, Springfield...	478,680	133,663	31,300
Manhattan, N. Y.....	108,317	22,195	13,798
Merchants', N. Y.....	71,000	.....	.....
Missouri Mutual, St. Louis.....	657,000	23,397	.....
Mound City, St. Louis.....	167,000	9,402	2,500
Missouri Valley, Leavenworth.....	84,408	5,172	.....
New England, Boston.....	180,000	122,000	19,000
Northwestern, Milwaukee.....	1,509,884	307,585	57,300
New York, N. Y.....	207,667	128,578	61,600
North America, N. Y.....	223,771	27,332	7,000
National, N. Y.....	111,500	8,499	1,000
National, of Washington, D. C.....	245,361	24,308	18,889
National, Montpelier.....	57,600	.....	.....
National, Chicago.....	3,743,000	33,793	11,423
New Jersey, Newark.....	200,000	8,000	.....
Phoenix, Hartford (not stated).....	.....	.....	.....
Pacific, San Francisco.....	14,300	3,674	.....
Penn Mutual, Philadelphia.....	60,000	9,389	5,000
Protection, Chicago.....	1,185,000	17,154	2,500
Republic, Chicago.....	(Not stated)	.....	13,000
St. Louis Mutual, St. Louis.....	448,600	62,548	11,000
Security, N. Y.....	292,850	49,130	23,000
State Mutual, Worcester.....	13,500	5,763	.....
Teutonia, Chicago.....	667,232	60,548	5,000
Union Mutual, Maine.....	648,880	81,641	21,000
United States, N. Y.....	185,400	23,706	4,000
Universal, N. Y.....	413,750	19,588	4,000
Union Central, Cincinnati.....	577,956	12,128	2,077
Washington, N. Y.....	142,603	95,102	38,200
World Mutual, N. Y.....	36,954	6,716	.....

—AUDITOR WILLIAMS reports the condition and aggregate business of Ohio joint-stock fire insurance companies for the year ending December 31, 1871, as follows:—

Amount of paid up capital (49 companies).....	\$6,430,147 91	
“ unpaid capital (stock notes).....	1,253,952 08	
Total capital.....		\$ 7,684,099 99
Aggregate amount of assets, including stock notes.....		\$10,991,786 66
“ “ “ excluding stock notes.....		9,727,834 58
“ “ “ liabilities, except capital.....		2,536,222 15
“ “ “ income during the year.....		4,816,589 28
“ cash expenditures.....		5,162,317 77
“ cash dividends paid.....		60,037 80
“ cash fire premiums received.....	\$3,763,011 75	
“ cash inland premiums received.....	507,709 88	
Total cash premiums for the year.....		\$4,270,721 63
Aggregate fire losses paid.....	\$3,069,967 81	
“ inland losses paid.....	386,659 53	
Total losses paid during the year.....		\$3,456,627 34
Aggregate fire risks written.....	\$318,691,552 88	
“ inland risks written.....	45,364,491 40	
Total risks written.....		\$364,056,043 78
Aggregate risks in force January 1, 1872.....		\$280,670,103 80

Condition and business of Ohio mutual fire insurance companies for the year ending December 31, 1871:—

Aggregate amount of assets, including premium notes.....	\$4,465,415 97
“ “ “ premium notes held by the companies.....	3,611,983 35
“ “ “ liabilities.....	639,956 03
“ cash income for the year.....	377,615 02
“ cash expenditures.....	253,044 77
Cash premiums for the year.....	289,245 63
Cash collected on assessments.....	58,438 21
Notes taken during the year liable to assessment.....	826,176 30
Aggregate losses paid.....	161,598 40
“ risks written during the year.....	41,906,400 67
“ amount of risks in force January 1, 1872.....	136,803,435 98

Business done in the State of Ohio by Ohio joint-stock fire insurance companies during the year 1871:—

Amount of fire risks written.....	\$134,404,898 12
“ inland risks written.....	80,326,370 46
Total risks written in Ohio.....	\$185,731,268 58
Amount of fire premiums received.....	\$1,579,074 23
“ inland premiums received.....	456,006 92
Total Ohio premiums received.....	\$2,035,081 14
Amount of fire losses paid.....	\$495,477 64
“ inland losses paid.....	343,768 98
Total Ohio losses paid.....	\$839,246 62

Business done in Ohio during the year 1871 by fire insurance companies of other States and foreign governments:—

Aggregate amount of fire risks written.....	\$159,480,119 26	
" " inland risks written.....	4,755,154 66	
Total Ohio risks written.....		\$164,185,273 92
Aggregate amount of fire premiums received.....	\$1,764,123 71	
" " inland premiums received.....	55,044 05	
Total Ohio premium receipts.....		\$1,819,167 76
Aggregate amount of fire losses paid.....	\$320,720 50	
" " inland losses paid.....	33,340 15	
Total Ohio losses paid.....		\$354,060 65
Excess of premium receipts over losses paid.....		\$ 1,265,107 11
Risks written the previous year.....		167,879,157 24
Premiums received the previous year.....		1,910,516 61
Losses paid the previous year.....		837,584 36
Excess of premium receipts over losses the previous year.....		1,072,922 35
Grand summary of business in Ohio during the year ending December 31, 1871, by all the fire insurance companies:—		
Ohio risks written by Ohio joint-stock companies.....	\$165,731,268 58	
" " " mutual companies.....	41,906,410 67	
" " companies of other States.....	164,185,273 92	
Total risks written.....		\$371,822,943 17
Ohio cash premiums rec'd by Ohio joint-stock companies.	\$2,085,083 14	
" " " mutual companies....	289,245 63	
" " companies of other States..	1,819,167 76	
Total premium receipts in Ohio.....		\$4,143,496 53
Ohio losses paid by Ohio joint-stock companies.....	\$339,245 63	
" " " mutual companies.....	161,508 40	
" " companies of other States.....	554,060 65	
Total losses paid.....		\$1,554,814 67

In the foregoing statement no estimate is included of the business done in Ohio by forty-one fire insurance companies of other States doing business in this State which, in consequence of the Chicago fires, having been compelled to close business, made no returns to this department. The business of the four Cincinnati companies that have retired, and the four Cleveland companies that have failed or suspended, is not included.

RECEIPTS AND EXPENDITURES OF THE INSURANCE DEPARTMENT.

Statement of the amount received from fees paid by insurance companies, and from all other sources, during the fiscal year ending November 15, 1871, and of the expenses of the department for the same period.

<i>Receipts.</i>		
Fees paid by insurance companies, and from other sources.....		\$24,581 25
<i>Expenditures.</i>		
For printing reports, laws, and blanks.....	\$1,519 18	
" binding and ruling.....	258 00	
" paper for same.....	1,917 51	
" postage.....	450 00	
" express charges.....	40 98	
" clerical services.....	5,386 33	
" advertising.....	18 00	
		9,590 00
Excess of receipts.....		\$14,991 25

Ohio Joint-stock Fire and Fire-marine Insurance Companies, December 31, 1871.

COMPANY.	Capital paid up.	Assets, including stock notes.	Liabilities, except capital stock.	Aggregate risks in force, Dec. 31, 1871.	Ratio of loss to premiums	Ratio of expense to premiums.
Alemannia, Cleveland..	\$250,000 00	\$425,605 63	\$139,074 83	\$ 7,377,912 35	\$1.92	41
Amazon, Cincinnati....	500,000 00	781,756 93	180,297 77	11,236,982 00	12	26
American, * Cincinnati.	100,000 00	114,658 07	22,495 49	1,632,316 33	1.00	84
Andes, Cincinnati.....	1,000,000 00	1,733,674 17	758,634 14	81,005,527 97	84	34
Aurora, Cincinnati.....	100,000 00	123,758 08	20,334 88	3,668,277 00	33	34
Burnet, Cincinnati.....	60,000 00	115,764 19	13,140 91	1,216,487 24	63	41
Butler, Hamilton.....	13,860 00	75,525 71	6,368 48	1,406,465 00	61	41
Capital City, Columbus.	70,000 00	115,488 87	3,367 42	1,096,412 00	62	31
Central, Columbus.....	50,000 00	111,181 29	3,367 42	1,096,412 00	62	30
Central, Dayton.....	20,838 83	110,212 15	7,660 50	1,278,173 00	71	39
Cincinnati, * Cin'nati..	150,000 00	171,634 45	32,587 88	3,552,258 00	1.29	35
Citizens', * Cincinnati..	52,500 00	107,873 40	28,056 74	2,376,901 00	1.14	39
Commercial, * Cin.....	100,000 00	160,152 84	28,490 42	2,205,047 00	67	32
Cooper, Dayton.....	23,900 00	112,626 05	7,659 06	1,694,830 63	70	43
Eagle, * Cincinnati.....	100,000 00	180,391 48	12,755 14	2,908,269 00	27	36
Enterprise, Cincinnati..	223,700 00	386,019 81	76,694 02	7,133,377 00	65	33
Eureka, Cincinnati.....	84,350 00	187,793 88	26,298 33	1,274,962 00	1.17	19
Farmers', Cincinnati...	88,917 08	113,098 18	11,360 90	1,332,648 00	47	23
Farmers', Howard.....	100,000 00	147,221 80	16,994 75	5,460,298 00	60	16
Far. & Merch., Dayton.	32,000 00	125,783 09	12,744 64	2,189,500 00	37	31
Far. Mer. & Man., Ham.	100,000 00	138,063 59	18,800 00	3,499,742 05	22	34
Firemen's, * Cincinnati..	100,000 00	212,540 58	51,170 57	3,249,151 00	1.08	28
Firemen's, Dayton.....	100,000 00	141,882 50	21,292 05	4,016,617 44	29	36
Franklin, Columbus....	80,000 00	116,882 08	3,367 42	1,096,412 00	50	30
German, Dayton.....	24,375 00	181,752 77	6,957 54	1,388,311 66	29	39
Germania, Cincinnati..	100,000 00	138,241 89	24,893 66	2,404,760 00	28	40
Germania, Toledo.....	53,000 00	108,909 08	9,869 28	1,766,585 00	52	31
Globe, Cincinnati.....	100,000 00	173,615 63	55,973 81	2,587,149 00	1.49	37
Hamilton, * Hamilton..	37,500 00	62,946 96	6,685 02	1,124,129 96	14	52
Hibernia, Cleveland....	200,000 00	205,038 73	61,938 26	2,974,160 00	1.40	47
Home, Columbus.....	500,000 00	871,452 81	328,975 87	52,336,428 00	88	41
Home, Toledo.....	75,000 00	163,479 32	11,874 78	713,691 83	72	25
Jefferson, Steubenville.	56,155 00	125,302 23	7,257 67	1,951,339 00	7	34
Mercantile, Cleveland..	200,000 00	247,299 45	21,837 88	5,274,208 00	.....	.....
Merch. & Manuf., * Cin.	150,000 00	270,218 50	41,517 16	3,918,437 00	76	45
Miami Valley, * Cin.....	100,000 00	116,919 60	21,881 53	6,163,361 00	1.12	30
Miami Valley, Dayton..	31,100 00	121,387 67	10,154 87	1,788,397 00	39	26
Mutual, * Toledo.....	90,000 00	85,341 59	5,356 02	757,091 00	1.14	23
National, * Cincinnati..	100,000 00	134,642 01	28,847 34	3,436,418 00	59	26
Ohio, Chillicothe.....	43,000 00	112,704 49	6,779 84	1,529,889 00	14	43
Ohio, Dayton.....	40,657 50	134,087 79	18,580 80	3,265,890 00	33	30
Peoples', Cincinnati....	20,000 00	122,426 85	8,856 19	981,137 00	95	51
Sun, Cleveland.....	200,000 00	290,051 93	71,970 52	12,988,447 00	1.69	28
Teutonia, Dayton.....	27,500 00	134,266 05	16,353 83	2,666,589 54	20	30
Toledo, * Toledo.....	75,000 00	92,194 29	4,863 16	376,766 00	1.12	25
Triumph, Cincinnati...	500,000 00	793,669 73	187,210 12	12,803,321 00	6	37
Union, Cincinnati.....	100,000 00	126,466 25	26,271 20	2,324,185 00	1.03	32
Washington, * Cin.....	100,000 00	122,935 58	18,580 97	1,914,274 00	1.49	53
Western, * Cincinnati..	100,000 00	158,804 87	44,770 00	3,210,421 00	1.03	21
Totals.....	6,430,147 91	10,927,064 99	2,557,268 53	283,644,263 80		

* These companies have special charters.

The Capital City and Central, both of Columbus, have recently retired from business.

The following is the life insurance business of Ohio, transacted in 1871:—

	<i>New pols. issued.</i>	<i>Am't. insured.</i>	<i>Losses paid.</i>
Ætna.....		\$.....	\$ 65,778 69
American, Philadelphia.....	170	310,247	11,500 00
American Popular.....	81	48,821	.....
Anchor.....	162	654,240	1,000 00
Asbury.....	43	66,000	2,070 00
Atlantic Mutual.....	622	438,585	11,500 00
Berkshire, Mass.....	122	282,967	6,000 00
Brooklyn.....	59	109,500	2,000 00
Charter Oak.....			44,100 00
Chicago, Chicago.....	206	274,655	5,000 00
Cincinnati Mutual, Cincinnati.....	1,077	1,791,492	.....
Commonwealth.....	76	258,000	.....
Connecticut General.....	114	176,000	.....
Connecticut Mutual.....	564	2,104,400	161,880 00
Continental, Hartford.....			19,800 00
Continental, N. Y.....	831	1,662,000	17,400 00
Covenant Mutual.....	44	60,500	.....
Craftsmen's.....	85	58,000	4,000 00
Economical.....	23	101,400	15,042 06
Empire.....	102	.....	2,000 00
Empire State.....	38	78,000	.....
Equitable, N. Y.....	816	1,049,195	39,000 00
Excelsior.....	21	81,500	.....
Germania.....	135	207,200	29,716 66
Globe.....	42	60,046	5,000 00
Government Security.....	11	30,000	.....
Guardian, N. Y.....			28,000 00
Hartford Life and Annuity.....	79	161,000	8,000 00
Home, N. Y.....	804	390,775	19,500 00
Hope, N. Y.....	180	230,100	.....
International Life and Trust, N. J.....	22	35,500	.....
John Hancock.....	298	547,100	18,000 00
Knickerbocker.....	137	243,080	26,100 00
Life Association of America.....	45	276,500	.....
Manhattan.....	77	173,741	21,285 00
Massachusetts Mutual.....	213	497,405	17,000 00
Merchants', N. Y.....	17	62,500	5,000 00
Michigan Mutual.....	240	808,000	.....
Missouri Mutual.....	88	210,000	.....
Missouri Valley, Leavenworth.....	72	350,500	.....
Mutual, Chicago.....	15	19,000	.....
Mutual, N. Y.....	575	4,170,542	116,000 00
Mutual Benefit, Newark.....	510	1,477,000	.....
National, Chicago.....	800	976,000	.....
National, Montpelier.....	614	938,500	.....
National Capitol, Washington.....	181	468,500	.....
National, of Washington, D. C.....	252	469,738	10,868 92
New England.....	93	157,000	49,000 00
New Jersey.....	150	359,500	.....
New York.....	423	1,261,000	85,700 00
North America, N. Y.....	84	64,500	5,000 00
Northwestern Mutual, Milwaukee.....	515	1,112,849	47,100 00
Pacific Mutual, Sacramento.....	5	19,200	5,000 00
Penn Mutual, Philadelphia.....	57	155,000	26,900 00
Phoenix, Hartford.....	326	766,652	19,500 00
Piedmont and Arlington, Richmond..	14	23,800	.....
Protection, Chicago.....	265	265,000	.....
Provident Life and Trust.....	293	580,941	10,000 00
Security.....	819	1,238,750	39,600 00
State Mutual, Mass.....	2	2,000	5,000 00
St. Louis Mutual.....			18,500 00
Teutonia, Chicago.....	118	144,500	2,000 00

Travelers', Hartford	1,784	5,668,801	19,000 00
Union Central, Cincinnati.....	1,763	3,529,074	12,273 00
Union Mutual, Me.....	883	739,100	13,000 00
United States.....	195	845,920	8,000 00
Universal.....	157	374,100	7,000 00
Washington.....	85	100,250	21,000 00
World Mutual.....	12	26,000	1,000 00

—We find the following in the legal department of the Western Insurance Review: The Charter Oak Life was sued on a policy on the life of Gen. S. J. McGroarty. One of the defences set up by the company was breach of warranty in this, that the applicant, when requested to state his residence at the time of making the application, stated it to be Cincinnati, which answer was in fact untrue; that at the time he resided at College Hill, Hamilton county, Ohio, by reason of which the policy is null and void. The plaintiff replied that College Hill is a suburb of Cincinnati, that the insured transacted his business and had his post-office in Cincinnati, and that to all intents and purposes within the meaning of the policy, his residence was in Cincinnati. To this reply the defendant answered: The application was referred to in the policy. In sustaining the demurrer, the court, Judge Hagans, says: I feel obliged, therefore, to hold that the answer given to the question as to the residence of the assured, is an express warranty, made so by the contract itself, and being the affirmative of an existing fact, though wholly immaterial, must be strictly and literally true; and no evidence can be given to contradict, control, restrain, vary, or extend it, but it must be construed to mean exactly what it says. *Smith vs. Charter Oak Life*, Superior court, Cincinnati, May, 1872.

—STATEMENT of the entire receipts and disbursements of the *Ætna Life Insurance Company of Hartford*, from the beginning of business to January 1, 1872:—

Entire receipts.....	\$35,348,059 39
Paid to policyholders for claims by death and matured endowment.....	\$5,277,356 08
For surplus premiums.....	6,149,287 41
For surrendered policies.....	1,821,197 28
Total paid to policyholders.....	\$13,247,840 73
Total expenses of management.....	4,577,851 19
Paid for taxes.....	401,117 41
Paid for reinsurance.....	964,470 63
Total disbursements.....	\$19,191,279 84
Balance.....	\$16,156,780 05
Add for market value of stocks and bonds over cost, accrued interest, value of reinsurance, and amounts due from other companies for loss on policies of reinsurance.....	484,006 19
Assets, January 1, 1872.....	\$16,640,786 24

—In California, at the close of 1871, there were in force under life policies, \$65,616,900.26 of insurances. During the year 1871 there were 4,583 new life policies issued, the premium thereon being \$597,865.32; upon 13,874 policies previously in force, \$2,594,098.91 of premiums were received. Total losses and endowments paid, \$678,587.22. The new policies were issued by the different companies respectively, as follows: California Mutual, 251; Pacific Mutual, 604; *Ætna Life*, 42; Atlantic Mutual, —; Brooklyn, 144; Charter Oak, 83; Connecticut Mutual, 156; Continental, 276; Craftsmen's, 81; Eclectic, 97; Economical, —; Empire Mutual, 58; Equitable, 187; Germania, 46; Globe Mutual, 17; Government Security, 76; Guardian Mutual, 41; Life Association of America, 87; Manhattan, 196; Mutual Life, 231; Mutual Benefit, 23; National of U.S.A., 7; New England Mutual, 302; New York Life, 83; North America Life, 43; Northwestern Mutual, 98; Phoenix Mutual, 83; Piedmont and Arlington, 65; Security, 50; St. Louis Mutual, 11; Traveler's, 519; Union Mutual, 339; Widows and Orphans' Fund, 195; World Mutual, 22. Totals, 4,583.

—We have received from the Messrs. Goodsell, of the Spectator, a specimen of their admirable book-craft—exquisite, as might be anticipated, in type, press-work, and material—entitled a *Treatise on the Principles and Practice of Life Insurance*, by Nathan Willey, actuary. In this octavo of 176 pages Mr. Willey improves and expands his smaller work, issued under the title of the *Cost of Life Insurance*—the original “cost” by actuaries’ mortality, 4 per cent., being properly followed up with American Experience, $4\frac{1}{4}$ per cent., and accompanied by very elaborate tables from both standards, and examples of special formulae. The original design to substitute simple arithmetical equations without the use of algebraic notation is further pursued, and with some additional advantage to the non-professional student of the subject. Compilers of this character are apt to omit what is essential to the guidance of the inquirer; and as the treatment is improved by present accretions, it will be further advanced by greater elaboration. Mr. Willey’s explanation of life insurance, in respect to its calculuses, beginning with the division of the dead by the living for the death probability, and thence constructing premium through the use of the discounts of the D and C Commutation columns, and the summations of the N and M columns would be more than doubled in value if double the present space were allotted to it.

—THE consolidation of the life interest progresses, and will be likely to continue until one-fourth of the companies of 1871 are merged into the remaining organizations. The Continental, of New York, absorbs the Empire; the Hope Mutual takes the Craftsmen’s. No arrangements have, up to the time we write, yet been made public for diminishing the present low premium stock companies, though we hear of a projected coalescence in this direction.

That there are instances when further amalgamations will be beneficial is beyond doubt; but at the same time, it is well to be on the lookout that opportunities are not taken advantage of to wreck companies for the purpose of securing distribution of plunder.

—CRARY & WALKER is the name of a new New York fire and marine firm of agents and brokers, the members of which are Charles H. Crary, of the late Manhattan Fire, and Allen R. Walker, recently of the Knickerbocker Life.—These gentlemen are well known in insurance circles, where their ability to carry out the purpose of their association has been well exemplified. The new firm is in a position to command an acceptable line of business.

—LIVING together as they collapsed together the Capital City and Central Insurance companies, of Ohio, appear in the auditor general’s report for the year ending December 31, 1871, with an evenness of annual premium, amount insured, and liabilities, that afford another example of twins undistinguishable in life dying together.

—THE Hamburg-Bremen fire insurance association has been the first, we believe, of German fire insurance companies, to adopt the principle of perpetual insurance on buildings. It offers to the owner the option either of deposit twenty times the annual rate, or the guarantee of securities of equal value deposited in the Bremen bank, bearing 5 per cent. interest, the company to receive the coupons when due. Notice of three months is required for termination of contract, either by insurer or insured. It will be observed that the German deposit, in its proportion to annual premium, is about double the American ratio.

—IN Wolford’s *Insurance Cyclopædia*, part 3, published by J. H. & C. M. Goodsell, under the title “Assets,” capital sunk in establishing business is considered an asset where it has created a force to restore amount expended to the treasury without cost of annual interest, viz.: 1. If in carrying on the business, sufficient annual profit is secured beyond the annual interest on the outlay to gradually replace such outlay; or, 2, if the business be sold, it shall realize the sum at which it is stated.

—THE secretaries of the late Enterprise Insurance Co. of Philadelphia, Messrs. Alex. W. Wister and Jacob E. Peterson, unite as the firm of Wister & Peterson, for the transaction of a fire agency business. Being part of the officery of the admirable Enterprise, satisfactorily performing their duties in that company, the members of the firm need no new commendation. Messrs. Wister & Peterson will represent the Humboldt, of New York, and Meriden, of Connecticut.

—THE assignee of the Merchants’ Insurance Company of Chicago, Wm. E. Rollo, gives notice that a dividend of 4 per cent. will be paid to claimants. This company had \$5,986,000 at risk in the burnt district. Total loss claims adjusted, \$5,484,017.42; total liabilities, \$5,666,717.42; nominal value of assets, \$710,364.30; estimated cash value, \$800,661.95. Lease of company’s building lot (25 years unexpired) with debris, sold for \$5,000.

—THE Reserve Life, of New York, passes to the guardianship of the Guardian Life. The vice-president and president of the Guardian are respectively president and vice-president of the Reserve, and the Reserve is held in reserve for ultimate union with the Guardian. A new rendition of the life insurance motto, “guard the reserve.”

—A COMMITTEE representing the Underwriters’ Association of New Orleans (combining a fire capital of \$8,000,000) are now visiting the cities of the Atlantic coast preparatory to establishing agencies. This combination proposes to carry a line of \$100,000 on single risks.

—THE persistent efforts of the Queen Insurance Company to gain a good business footing in London have at length resulted in a measure of success: the London expenses, which were formerly a percentage of 115 to premium, have been reduced to 35 per cent.

—THE Old Dominion Fire, of Richmond, Va., has complied with the laws of Pennsylvania, Messrs. Brande & Cheyney, agents.

—THE Iron City Fire (new) is in progress in Pittsburgh, Pa., with a capital of \$200,000.

RAILWAYS AND TRANSPORTATION.

ERIE stock and the future management of that road, continues to excite the usual amount of interest in railroad and financial circles, and since the change of management, the mutations in the value of its securities have been of a much more violent nature than ever before. The breaking of the ring which had controlled it and its apparent stability, gave even cautious operators greater confidence in its future than was justified by its actual condition, and under these influences, aided, doubtless, by private manipulations, its stock arose to nearly double the value it had previously held. This state of things was altogether too good to last, and it was quite time for the "bears" to enter the ring, which they did, and aided by outside events, of which these gentry are never slow to take advantage, they sent the value of Erie down with a rapidity that nearly produced a panic.

Both "bulls" and "bears" have been much aided in their manipulations by the conflicting rumors which have been circulated in regard to who was to control its immediate future; the announcement that Col. Scott had been asked to take the presidency, tending to send the stock up, and the contradicting of that rumor sending it down rather below its previous level. It now seems that negotiations were indeed entered into looking to that result. Col. Scott had an interview in New York with the authorized representative of the English stockholders, and everything proceeded satisfactorily until the English negotiator advanced as a condition precedent, that Col. Scott should resign his connection with the Pennsylvania railroad, and devote his whole time and talents to Erie. The views of the English owners in opening these negotiations, and the attachment by them of the condition, are certainly creditable to them. They viewed the matter from a purely business standpoint, and doubtless had the idea that Erie would be better served if the managers were all freed from entangling alliances, and the road run on its own merits. Of course, however, there could be but one answer to this on the part of Col. Scott—he could not afford to sever his connection with that corporation which he and his associates have made the greatest in the world, and that, too, at a time when from its magnitude and the multiplicity of its connections it calls for most careful supervision, and the proposition was unhesitatingly rejected. As the 9th of July approaches, there is considerable curiosity manifested to know who will be the choice of the stockholders. Rumor was never busier, but as usual, the prognostications are extremely vague and unsatisfactory. The English stockholders express anxiety about the election, whether it will be fairly conducted or not, and an honest and capable board be chosen. As they control, probably, at least seven-eighths of the stock, and there is no possibility of an election except by a majority of the shares, they will have no one but themselves to blame for bad management hereafter. Everything seems favorable this year to operating this road most advantageously. The coal production which was last year interrupted for months, is now, and continues to be exceptionally large; the general traffic is probably larger than ever before, and rates have been not only well maintained, but there seems a prospect of a rise rather than of a reduction. The traffic of the road for the two months reported shows a large increase, and if the working expenses are not reduced to the smallest practicable amount, and the

comparative net balance in favor of the shareholders very large, it is not for want of power in the management. Among the rumors current is one that there is after all no understanding between the Heath & Raphael and Bischoffsheim & Goldschmidt parties, but if it be true that the latter control 415,000 shares to the former's 171,000, the former are certainly powerless, though Bischoffsheim & Goldschmidt do not control a majority of the whole vote. In this connection it is proper to say that Heath & Raphael are rumored to be at work harmonizing the opposition to Bischoffsheim & Goldschmidt, and will attempt to restore Gould to the control, which seems incredible. The coming man is thought to be Mr. James F. Joy, it being deemed possible and desirable to unite the Atlantic and Great Western, and the Michigan Central with Erie, against the New York Central. Such a combination is certainly desirable for Erie at least, but is it possible? There is enough doubt about it to make it interesting.

—Some of our cotemporaries whose interests are bound up in the prosperity of Chicago, seem to be rather uneasy over the future of that city considered as the great railroad centre of the country, and we are not sure but some of their forebodings may be realized, though, of course, we would not be understood as expressing a wish, or an opinion even, that although the grain traffic should seek more direct routes to market than through that city, it would ever fail of being a place of much importance as a railroad centre. The facts upon which they comment, and we think with reason, are, that within a few years the number of railroads from east to west across the State of Illinois has greatly increased, and a large part of the lines, long or short, lately constructed, or now in progress, may be classed with these east and west lines, or are feeders of them; that while the north and south roads from Chicago have their chief value as carriers of traffic to and from Lake Michigan, their eastward bound freight has necessarily been transhipped at Chicago, and they may be very appropriately termed Chicago railroads. These new east and west roads are designed to carry the traffic of the west directly to the east, and the further fact is commented on that an air line drawn from any or most of the agricultural and business centres of the West to Philadelphia, New York, or even Boston, would pass south of Chicago. All these are pertinent facts, and various others may be mentioned which go to show that the producers are becoming more and more impatient of the expense and delay attending the carriage of their produce to market, and are directly and indirectly moving on all sides to remedy the evil. It is conceded that the reason of Chicago's pre-eminence heretofore was the greater cheapness of water carriage over that of railways, and it is very important to Chicago, and to all railways having their northern or eastern terminus in that city, that this difference should be maintained, for, with rates of carriage by land and water nearly equal, very little freight would be transported by water. This is undoubtedly true, supposing Chicago to furnish the only available port of shipment, but several other lake ports are contending with that city for a share of the traffic, and one, Milwaukee, is already no mean competitor.

But the great highway, the Mississippi, is also contending for the prize. The steamboat men of that river claim that with properly constructed bins, they can carry grain in successful competition with the railroads, and that the cargoes appreciate in value by means of the method adopted for ventilation during the transit. If this is so—and many steamers are being rebuilt for the purpose of engaging in the trade—this river may after all do much of the carrying trade, especially of that portion whose goods are intended for the foreign market.

In this connection, too, it is well to remember the proposed inter-oceanic canal, which, although the prospects of its being soon completed are not very flattering, still its ultimate completion is by no means improbable, and when finished, it will doubtless do much to divert coarse freights from Chicago and the lakes.

Nor is it well to overlook the new and important railway project for a more direct line between St. Louis and the southern Atlantic States. This enterprise is, and has been for

a space of time, the subject of earnest discussion by the Georgia and Missouri press, and by the people as well. One scheme is for a comparatively short line of 220 miles, which would have Griffin, Ga., on the line of the Central railroad of Georgia, for its initial point, and running thence northwest, with Decatur, Ala., as its objective for the present. It is proposed to run round the Alleghenies just below Lookout mountain, near Gordon, Ala., thus avoiding the heavy mountain grades. The people of both Savannah and St. Louis seem fully resolved that this connection shall be made right speedily, and it will doubtless be done, and must prove a valuable route. Indeed the South teems with new railroad projects, and the tendency seems to be to multiply means of communication between that section and the great West; and while the old avenues of transportation will doubtless be crowded, the business will hereafter be too immense for any one city or corporation to control more than a small portion of it.

—It is announced that sometime in the present month, the running time between Philadelphia and Richmond will be reduced from 15 hours to 12. This saving is to be accomplished by the completion of the Alexandria and Fredericksburg railroad, now almost finished. This road extends from Alexandria to Quantico creek, a distance of 88 miles, near which place it joins the Richmond, Fredericksburg, and Potomac extension. From Quantico to Fredericksburg the distance is 22 miles, and from thence to Richmond 60 miles. The extension crosses Aquia creek on a long bridge, three miles west of the old steamboat wharf, and joins the old track at Brooks's station, four miles from the old landing.

This new road is destined to become a very important link in the southern railway system, and is due to the energy and perseverance of the Southern Security Company, the effects of the efforts and sagacity of which are just beginning to be appreciated. This company has also leased the Western North Carolina railroad. This road extends from Salisbury, on the North Carolina railroad, nearly due west in the direction of Knoxville, Tenn., 105 miles to Marion. It had, before, lines in its control completing this route north to the Potomac, and also a complete line from Memphis to Bristol, on the Virginia border, but at Bristol, the Atlantic, Mississippi and Ohio railroad, commonly known as "Gen. Mahon's road," has at present the control, and as its interests are supposed to be hostile to the Southern Security Company, the latter have been devising ways and means to remove the obstruction. Among the schemes proposed by the Security company to this end, was to encourage that part of the proposed Norfolk and Great Western road between Danville and Bristol, by which it would be able to "flank" Mahon's road. Another plan is to extend the Western North Carolina road over the mountains to Morristown, Tenn., and thus make the desired connections. This would necessitate the construction of 200 miles of road through a very difficult country, quite as long and difficult as the construction of the Danville and Bristol line, but the latter would unite the Memphis line with the Baltimore outlet, which the former would not. Another plan is to foster the Shenandoah Valley railroad: this will give an excellent connection with Philadelphia and the east, but will not give a Baltimore outlet.

—THE dominion of Canada clings to the idea that a railroad to the Pacific within its limits is not only desirable but practicable, and is proceeding slowly to develop the idea. Under the agreement for the union of British Columbia and the dominion, it was provided that the dominion government should secure the commencement from the Pacific coast on the one side, and the existing Canadian railway system on the other, of a through line; the commencement to be made on or before July 20, 1873, and the line finished on or before July 20, 1882, the government being authorized to make a grant of public lands along its extent not exceeding twenty miles wide, nor 50,000,000 acres in extent. As proposed—and an act has been passed by the dominion parliament for its construction—the title is to be the Canadian Pacific Railway. The work will be executed by a private corporation, and must have at least \$10,000,000 subscribed capital, of which at least one-tenth must be paid in as caution money before they are to be allowed to formally com-

mence the work. The money subsidy is limited to \$30,000,000, which the government will raise by loan. A report on the exploration survey of the route had been laid before the parliament, and from it, it appears that a point named Mattawa, opposite Lake Nepissing, has been selected as the eastern terminus; the Pacific terminus, and the route remaining as yet undetermined, several routes and termini being mentioned. The report further shows that the average elevation of the line will be less than the Union Pacific. It may be that a route across the continent at this latitude is practicable; at all events it will do no harm to thoroughly explore this region, but we think that the Northern Pacific is located as far north as can be expected to prove remunerative.

—It was announced some time ago that a consolidation of the Central railroad of New Jersey and the Delaware, Lackawanna and Western railroad had taken place, but no particulars were at the time given. Now, however, the whole agreement is published, and as it is too long for insertion, we give the following synopsis of it: 1. The entire corporate properties, stock, and franchise, are hereby considered, and to be hereafter *forever* operated as a joint estate. 2. The ordinary current business of each corporation shall continue for the present to be managed and controlled by their respective boards of managers, subject to the general joint-committee to be hereinafter provided for. 3. That the joint-committee for the present shall consist of the president of each company, and five directors of each company. 4. Said committee to hold regular monthly meetings. 5. The object of this agreement is for the purpose of effecting an equal and perpetual union of interests between the parties hereto. 6. The agreement to be perpetual and binding upon the successors and assigns of each party. The directors of the Central company, commenting on the agreement, say (we condense): "The drawbacks against its ratification were considered to be, first, the great cost of the Morris and Essex road, leased at 7 per cent., and second, the broad gauge of the Lackawanna road, necessitating a change to narrow gauge. Against the losses involved in these two items are to be set the 25,000 acres of coal lands owned or controlled by the Lackawanna company, worth from \$15,000,000 to \$20,000,000, while the cost to the joint concern is not more than \$5,000,000. Considering this fairly to balance the two objections, and leave the collateral advantages of the union as clear gain, it is proper to say that the Morris and Essex road now very nearly meets, out of its earnings, the annual rent, as well as the cost of maintaining and running it. The mileage of road, practically brought under one management, is substantially as follows: Central, of New Jersey, and branches, 106 miles; Morris and Essex and branches, 181 miles; Lehigh and Susquehanna and branches, 185 miles; Delaware, Lackawanna and Western, 145 miles; Lackawanna and Bloomsburg, 80 miles; Binghampton and Utica, 98 miles; Binghampton and Syracuse, 80 miles; Syracuse and Oswego, 35 miles; Cayuga and Susquehanna, 33 miles: total, 893 miles. Much of this distance is double tracked, and the whole route well adapted to a harmonious and valuable business. The capital stock of the two companies is very nearly equal, each being about \$20,000,000." In conclusion, the directors earnestly advise the stockholders to accept and ratify the agreement.

—BORING the Hoosac tunnel continues with unabated ardor. The distance accomplished in the month of April from the four points of attack was 467 feet, leaving 6,060 feet still to be accomplished, which, at the present rate of speed, will carry the tunnel through in about a year from the present date. Mr. Endicott, the State auditor of Massachusetts, in obedience to an order of the house of representatives, sent a detailed statement of the cost of this tunnel since the State took possession, and figures up the total at \$12,792,334, considerably more than the whole cost of the Boston and Albany railroad.

—THE government statistical bureau has issued some figures bearing on the relative railroad growth and prosperity of the United States and several foreign countries. The railroad mileage of the United States at the close of 1871, is a trifle over 60,000 miles. The relative cost per mile is: United States, \$52,907; Great Britain, \$281,812; Prussia, \$85,287; Wurtemberg, \$91,955. The relative net receipts to income are: United States, about 28 per cent.; Great Britain, about 49 per cent.; Prussia, about 51 per cent.; Wurtemberg, about 24 per cent.

PATENTS, ARTS, AND SCIENCE.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Del.]

STEAM-JET air exhausts have been found useful in many of the arts where other methods of creating draughts would be inapplicable. In the alkali works in Lancashire and other parts of England, this method of creating a partial vacuum has been used to perfect the draught through the coke tower condensers, where muriatic acid is absorbed by water trickling over the coke, and a small jet of steam has been found as efficacious in maintaining a draught, as a tall chimney. At a meeting of the Institute of Mechanical Engineers, of London, Mr. C. W. Siemens read a paper on this subject, in which some important facts are announced. The form and application of the steam-jet having remained hitherto essentially the same as in the original steam-blast of the locomotive, it occurred to Mr. Siemens that much might be done to improve its effect by a judicious arrangement of the parts, so as to avoid eddies in the combined current of steam and air, and to utilize more completely the initial momentum of the steam. These objects have been accomplished by the employment of a very thin annular jet of steam in the form of a hollow cylindrical column discharged from an annular nozzle. The air to be propelled by the steam jet is admitted through an exterior annular orifice surrounding the jet, and also through the centre of the hollow jet; and the area of the air-passages is gradually contracted on approaching the jet, whereby the velocity of the motion of the entering air is so much accelerated before it is brought in contact with the steam, as to avoid the great difference in the velocity of the two currents at the point where they come together, which caused the eddies which previously impaired the efficacy of the steam-jet. By the annular form of this jet, the extent of surface contact between the steam and the air is greatly increased; and the quantity of the air delivered is, by this means, very much augmented in proportion to the quantity of steam employed. The combined jet of steam and air is discharged through an expanding delivery tube of considerable length, in which its velocity is gradually reduced, and its momentum accordingly utilized by being converted into pressure.

So powerful is this improved steam-jet that it has been applied for exhausting one of the pneumatic despatch tubes employed at the central telegraph station, in London, for conveying the carriers containing telegraphic despatches from one station to another. Compared with a steam engine and exhausting pump, it has been found that the expenditure of steam has been about the same for an equal amount of work; but the low first cost of the steam-jet, and also its great simplicity, as well as the economy of space, gives it a great advantage.

By the use of the annular steam-jet, water may be lifted from a moderate depth, the height of the lift depending upon the size of the jet and the pressure of the steam, and the consequent degree of vacuum obtained in the vessel. The discharge from the steam-jet being then admitted into the top of the vessel, allows the water to escape through a

delivery valve in the bottom, and aids in its expulsion. By using a pair of these vessels in combination, and putting the exhausting jet in communication with each alternately, by means of a self-acting float and reversing valve, one vessel is filling while the other is discharging, and a continuous delivery of water is thus obtained.

This steam-jet has been also proposed as an application for exhausting the air in the vacuum pans in sugar-boiling, so as to dispense with the present expensive pumps and other appliances: also, for draining molasses from sugar, by exhausting the air from below the perforated bottom of a strainer containing the undrained sugar—thus dispensing with centrifugal machines and other appliances.

—**QUITE** as many disputes arise among scientific men regarding the priority of announcing important discoveries, as occur among inventors respecting claims to the originality of patented processes. The assertions of several well-known savans, each claiming for himself the discovery and application of ether as an anæsthetic, formed quite an earnest controversy a few years ago. More recently, the honor of first having discovered chloroform has formed the subject of contention between chemists of such repute as Liebig and Soubeiran, and the former of these eminent savans has written an article in the *Annalen der Chemie und Pharmacie*, in which he claims the priority. Gmelin, in his Handbook of Chemistry, referring to chloroform, says it was "described by Soubeiran in 1831 as bi-chloric ether, and by Liebig in 1832 as chloride of carbon." It is claimed by the latter that although Soubeiran's thesis was published in October, 1831, and his own not until February, 1832, which would make it appear that Soubeiran's researches had been completed four months before his, yet that, among other circumstances to prove his priority, is the fact that he communicated to Dumas the discovery of his "chloride of carbon" six weeks before Soubeiran had made known the result of his investigations.

It would be going rather beyond our province to follow up the arguments which Liebig uses to assert his claim to the honor. It seems to us clear that he has succeeded in establishing the fact that he was familiar with chloroform, and had prepared it and investigated its properties before his French competitor had become acquainted with it. But so far as real priority is concerned, that is unquestionably due to Mr. Samuel Guthrie, of Sackett's Harbor, New York, who, in 1831, prepared large quantities of chloroform, which he called chloric ether, and communicated the manner of its preparation from alcohol and chloride of lime to Silliman's Journal. Prof. Ives, of New Haven, became so much interested in the new compound that he corresponded with Guthrie on the subject. There is abundance of evidence to prove that in the early part of 1831—and consequently before either Liebig or Soubeiran had completed his investigations, or had become aware of the nature of chloroform—Guthrie had succeeded in preparing it in large quantities. But, although the question of mere priority is thus settled, these three investigators are, we think, entitled to equal honor. It has often happened that important discoveries have been simultaneously made by different experimenters widely remote from each other; and although the one who can prove his claims to priority generally carries off the honor, yet the services of the others should be fully appreciated.

—**DR. BENRATH**, director of the glass works at Dorpat, Russia, has been for some time experimenting with a view to produce a glass which should possess all the good qualities of flint glass without its defects. The great cleanness of this glass, its high specific gravity, its easy fusibility, and its refracting power are desirable qualities. But while recognizing these advantages, its defects are no less palpable. Its softness, and the rapidity with which it may be acted on by chemical and mechanical means, are oftentimes felt as drawbacks to its more extended uses. The difference between ordinary glass and flint glass is that the latter contains silicate of lead, to which its brilliancy and high refractive power may be ascribed, while at the same time its softness, and the liability to become easily scratched and otherwise injured, are attributed to the presence of the same com-

pound. While common glass is composed chiefly of silicate of lime and soda or potassa, flint glass consists of these silicates mixed with silicate of lead. As early as 1829 Dorbier substituted baryta for lime in the manufacture of glass, his product being essentially a mixture of the silicates of soda, potassa, and baryta; but his product was too soft for ordinary use. Dr. Benrath's experiments have tended towards the use of less alkali, and an increased quantity of silica and baryta. One formula he used consisted of 1,000 parts sand, 785 parts sulphate of baryta, and 435 parts sulphate soda, (Glauber's salts.) An analysis of the product showed it to contain 58 per cent. of silicic acid, 80 per cent. of baryta, and 12 per cent. of soda. The glass was of a slight bluish tinge, which was probably due to the presence of sulphur reduced from the sulphates used in the mixture. As a result of Dr. Benrath's investigations he has announced that by the use of witherite, or carbonate of baryta, he has succeeded in making a glass uniting all the desirable qualities of the best flint glass, without any of its defects.

—An electro-chemical copying press has been recently invented by Signor Zucatto, of Padua, Italy, which, while it bears a close resemblance to the ordinary press in common use, yet it differs in many essential particulars. In the construction of this press the upper, or movable, surface consists of a plate of copper, while the lower surface consists of the same metal, tinned. Both plates rest on mahogany beds, the upper one being attached by lugs to the solid iron press-plate, while the lower one is made to slide out of the machine. These plates are placed in the circuit of a battery, so that when brought into close proximity by the action of the screw, the circuit is completed, and a current is established over the whole of the surfaces. In operating this press, a steel plate covered with a varnish—which is an insulating medium—is used. A sharp instrument, such as a "style," is used to trace letters or other characters on the varnished plate, which cuts through the varnish, and leaves portions of the plate unprotected. Sheets of prepared copying paper, dampened with a solution of prussiate of potash, are placed in contact with the varnished steel plate, and the whole subjected to pressure in the ordinary manner. The electrolytic action causes the formation of Prussian blue on the paper immediately in connection with the exposed parts of the steel plate, producing exact *fac similes* of the characters written upon it. The battery used in connection with this press consists of a single cell, with zinc and carbon elements, actuated by a solution of bi-chromate of potassa and sulphuric acid. The steel plate on which the writing is done requires to be thoroughly cleaned and evenly varnished. In writing, the varnish beneath the point of the style must be completely removed. A great number of copies may thus be taken from a single plate.

—In the manufacture of coal gas it is an object of the highest importance to remove as many of the sulphur compounds as possible. The ordinary methods of purification, whether by means of hydrate of lime or oxide of iron, are efficient in eliminating nearly all the sulphuretted hydrogen, but are wholly inoperative as regards the expulsion of bi-sulphide of carbon, which is equally injurious, and which on burning the gas, evolves sulphurous acid. It has been found in the periodical tests made of London-gas, that nearly all the sulphur is contained in the form of bi-sulphide of carbon, and many plans have been devised to insure its removal. Several years ago the Rev. Mr. Bowditch, rector of Wakefield, who, although a clergyman of the established church, is nevertheless a gas chemist of no little reputation, proposed to pass gas through heated clay, which he averred had the power of splitting up the bi-sulphide into sulphuretted hydrogen and carbonic acid, which are readily absorbed by the lime in the purifiers. Mr. Lewis Thompson, one of the most eminent chemists, and author of *Chemistry of Gas Lighting*, thoroughly examined the process of Mr. Bowditch, and pronounced it a failure in every respect. These experiments were made eleven years ago. Recently a Mr. Harcourt has revived the idea that by passing impure coal gas through a red-hot tube, the bi-sulphide of carbon may be decomposed as above described. It is said that crude gas thus treated is not only

rendered pure, but that its illuminating power is greatly increased. But, it seems to us, that this is the mere revival of an old idea, and we cannot see why the benefits now expected to flow from the adoption of the process, should not have been realized when they were first promulgated several years ago.

—Among obscure causes of disease, there are doubtless many which owe their origin to the poisonous properties of dyes and colors not generally thought to be dangerous. The deleterious effects of pigments composed of arsenical and cupreous compounds are pretty generally understood. By a large majority of people the aniline colors are thought to be innocent of harm; and yet they include many violent poisons which have doubtless already wrought much injury. Aniline itself is poisonous, and all colors which contain it in an unchanged state are injurious in proportion to the quantity in which it may exist. The general symptoms of poisoning by this substance are a changed color of the skin, deep violet color of the lips, an accelerated pulse, shivering of the whole body, trembling of the hands and feet, anxiety, and difficult respiration. Many of the oxidizing agents used in the preparation of the aniline colors are also poisonous, such as arsenic acid, chlorides of zinc and tin, compounds of antimony and lead, etc. The true cause of the poisoning is not the color itself, but the impurities present, and the acids—hydrochloric, arsenious, and picric with which it may be combined. The aniline greens and orange tints are often contaminated with picric acid. The aniline crimsons, which are prepared from residues and loaded with impurities, are most to be dreaded. Such colors, from their cheapness, are used in staining paper-hangings, wooden toys, matches, cheap confectionery and bon-bons, as well as India rubber articles. From many of these the color is easily removed. Woolen and mixed tissues dyed with the coal tar colors are now much used, owing to the brilliance and comparative cheapness of the color. Needle women and others, who have to work much with these materials, often suffer from the effects of the arsenic and picric acids. The fingers are inflamed, showing small pimples on a red ground, and the face is sometimes similarly affected. The phenol colors, prepared from carbolic acid—traces of which remain uneliminated—are equally injurious. Rosolic acid, corraline, and azuline, are rarely found in the market free from these impurities, and although they may not exist in quantities sufficiently large to produce immediate results, their continued use undoubtedly gives rise to diseases which defy recognition.

—THE fact that sulphurous acid is reduced to sulphur and sulphuretted hydrogen by the action of nascent hydrogen, evolved by the action of metallic zinc and dilute sulphuric acid, has been long known. Prof. Kolbe has recently announced in the *Polytechnisches Notizblatt*, that sulphuric acid may be thus reduced. This reaction was observed by the professor many years ago, from the strong smell of sulphuretted hydrogen eliminated from zinc and sulphuric acid. At first he was led to suppose that the sulphuric acid contained traces of sulphurous acid, but on investigating the question more fully, he found that pure sulphuric acid produced the gas, and even in larger quantities than the impure commercial acid. In his experiments to determine this fact, concentrated sulphuric acid was introduced into a Woulfe's bottle, containing zinc and water, by means of a funnel tube. The reaction clearly proved that the reduction took place, and it was also found that the warmer the liquid and the more concentrated the acid, the larger was the quantity of sulphuretted hydrogen mixed with hydrogen. If the acid be previously diluted with twice its bulk of water, no sulphuretted hydrogen is given off; but if concentrated acid is afterwards added, the characteristic odor of this gas is at once manifested.

This peculiar reaction should be borne in mind in the preparation of pure hydrogen in certain toxicological investigations, especially in the use of the Marsh test for arsenic. If notable quantities of sulphuretted hydrogen should be eliminated, it would have a tendency to precipitate a greater or less quantity of the arsenic, as the ter-sulphide; and hence in making such examinations, Prof. Kolbe advises the use of pure sulphuric acid diluted with at least twice its volume of water.

—ALTHOUGH the boiling point of mercury is not less than 662° Fahrenheit, yet it has long been known that it sensibly vaporizes at the ordinary temperature of the atmosphere. It was supposed by Faraday that it ceased to give off vapor at $19^{\circ}.4$ Fah., but more recent investigations, conducted with great care by M. Merget, and the results of which have been communicated to the *Comptes Rendus*, tend to show that the vaporization of mercury is a continuous phenomenon, and that it does not even cease on the freezing of the metal, which takes place at 89° below zero of Fahrenheit's scale. M. Merget also states that the vapor possesses considerable diffusive power, which, though not measureable with exactness, appears to attain a limit but little short of that assignable to it by the dynamical theory of gases; and that like other elastic fluids, mercury vapor condenses on such substances as carbon, platinum, etc., which exert no chemical action upon it, and that it passes with great facility through such porous bodies as wood, porcelain, etc. The test used by M. Merget was one of extreme delicacy, consisting of paper washed over with an ammoniacal solution of nitrate of silver, or with chloride of gold, platinum, palladium, or irridium, the action of the mercury being to reduce the metal of these compounds, and thus form a more or less decided stain upon the paper.

—ELECTRICITY has recently been impressed into a new mechanical service. It is well known that when a strong current is passed through a platinum wire the latter is heated to redness, and wire so heated has at times been used instead of the knife in certain surgical operations, especially in the removal of tumors. Probably with this application in view, a patent has been obtained by Dr. Robinson, of New York, for cutting wood in the same manner. A platinum wire is heated to redness, and being operated by means of insulated handles it is pressed against the wood, aided by a slight sawing movement. In this manner it is said that trees have been felled, logs have been sawed, and boards divided into pieces of any required size or shape. Of course the heated condition of the wire leaves the divided surfaces blackened and charred, but the extent of the burning is very slight, only a thin film of carbonaceous matter being left. However ingenious and novel may be this application of the galvanic current, we do not expect to see it universally adopted, and manufacturers of saws, axes, and other cutting tools, need not entertain any very serious apprehensions of an injurious competition with the implements they produce. It will probably be a long time before carpenter shops and other wood-working establishments will include a galvanic battery among their necessary articles of outfit.

—PROTOPLASMIC life seems to have experienced a powerful enemy in the shape of quinine. M. Binz has recently investigated the physiological effects of this drug. He ascribes to it a great power of arresting the progress of fermentation and putrefaction, while at the same time it is a violent poison for low organisms. Fungi and bacteria, which invariably accompany fermentation, are killed by it, and consequently the process of decay is arrested. Among its other effects, it stops the motion of white blood corpuscles, and prevents them from leaving the blood-vessels, while it destroys the power of certain substances to produce ozone. It likewise lessens the charge of tissue in the body, and consequently diminishes the production of heat. By the application of this substance oxidation of the blood is decreased. When putrid fluids are injected into the circulation, the temperature of the body is augmented; but if these fluids be previously mixed with quinine, the increase is either prevented or greatly diminished. The quantity of urea excreted is much lessened by the influence of quinine.

—WHEN fifteen to twenty grammes of granulated silver is introduced into a perfectly dry tube of hard white glass, with from thirty to forty grammes of bi-sulphide of carbon, and then hermetically sealed, on warming gently and then shaking in the dark, sparks are observed in the liquid, which by continued shaking may be rendered quite luminous. Pouring water on the tube causes the luminosity to disappear, but on shaking it becomes visible. This is a beautiful experiment. Iron and aluminum produce similar effects, while platinum, copper, and zinc do not.

—**PHOTO-ENGRAVING** on metals is accomplished in the following manner, according to a process invented by W. A. McGill, of Memphis: A pure silver plate, or an alloy plated with silver, after finely polishing, is subjected to the action of vapor of iodine, by which the plate is enfilmed with iodide of silver. The iodized plate is then exposed to the action of light in the camera, or under a photographic negative, until a faint image of the object is formed. The plate is then submitted to the action of an electrotype battery, (copper solution), when a well-defined image of the object in copper is formed, the cupreous precipitate attaching itself only to those parts of the plate which were rendered conductors of electricity by the action of light, while the unexposed parts will remain non-conductors. The plate is then dried, and an etching solution, composed of sulphuric acid and nitrate of potassa, poured on it. The solution immediately attacks the shadows, or exposed portions of the silver surface, while the cupreous deposit from the electrotype bath is not affected. After etching the required depth, the copper deposit on the plate may be readily removed by *aqua regia* which will not act on the silver plate, leaving upon it a finely etched image. Other applications of this process are to engrave or etch on steel, gold, or copper, and other substances.

—A **BEAUTIFUL** experiment showing the regelation of ice may be made by supporting the ends of a large block of ice, and passing around it, in the middle, a piece of wire about one-tenth of an inch in thickness, to the lower part of which a fifty-six-pound weight is hung. The wire will be gradually pulled through the ice, cutting a groove of its own diameter, until it passes entirely through, and the weight falls upon the floor. But, although the plane of passage through the ice is plainly marked, the block is not divided, and after the wire has cut entirely through the mass, it cannot be split in this place with a knife or chisel. Although the ice in immediate contact with the wire is melted by the pressure, it is immediately regealed, and acquires the same firmness and tenacity as if nothing had forced it asunder. This experiment has been tried by Prof. Bottomley, of Glasgow university, and also by Prof. Tyndall, in his admirable lectures. The theory of regelation, which was first proposed, we believe, by Thomson, has a very important bearing upon the phenomena of glacial movements, and has been thoroughly investigated by Tyndall in his studies regarding the movements of the well-known Alpine glaciers.

—**ACCORDING** to Rev. F. Moigno, when finely pulverized chlorate of potassa is put on a piece of paper—best dredged or dusted over it, so as to form a thin film of powder—and there is next poured over it a solution of phosphorus in bi-sulphide of carbon, there ensues, when the latter is evaporated suddenly, a most violent explosion, owing to the phosphorous being left in a state of extremely minute division, and in intimate contact with the chlorate of potassa. This explosion is analogous to that which ensues when a small piece of phosphorous and some chlorate of potassa are, when placed on an anvil, struck with a hammer; but in the instance alluded to, the effect produced is greater, owing to the extreme state of division, and intimate mixture of the two substances. Care should be taken not to make this experiment with too large quantities of the chlorate and phosphorous solution, for fear of serious accidents which might ensue.

—**M. LOUVEL** has suggested to the French academy, the idea of storing wheat and other grain in potrable sheet-iron granaries, which are made strong enough to permit a partial vacuum—equal to from three to four inches of mercury—to be maintained in them. This exhaustion of the air has been found, by a careful experiment, to be sufficient to destroy insect life, as well as to free the grain from moisture by evaporation, although a still more rarified condition of the air is preferred. These grain receptacles are cylindrical in shape, with convex top and bottom. The grain is introduced through an opening in the top, in which is also a pipe provided with a valve for the exhaustion of the air. Experiments were made in which living insects were introduced with the grain, all of which were destroyed before they had had time to do any mischief, and at the expiration of six months the wheat was found to be in an excellent condition.

INDUSTRIAL INTELLIGENCE.

—**GENERALLY** the manufactories of Philadelphia are running under full orders. We especially note great activity among machinests, boiler-makers, iron and brass founders. The steel manufacturers have orders ahead of their present capacity; slate works are nearly equally as busy. Some of the minor branches compete in activity with leading interests. Contracts for future delivery, three or more months time, have been somewhat restricted by apprehension of strikes, but the late disturbances show here no other appreciable effect outside of two or three mechanical branches—prominently cabinet-makers.

It is estimated that out of the patents issued to Philadelphians since the first of the year, that there are 200 which are now worked, and contribute their share towards the industrial progress of the city.

The great ascent in prices of iron up to June 1, was more than maintained during the month. In the early part of the month, foundry and forge iron were inactive, but subsequently there was a good demand for Nos. 1 and 2, and sales freely made at quoted prices. Stock of scrap-iron small; demand light. We give weekly quotations: higher figures are anticipated for July:—

	June 8.	June 15.	June 22.	June 29.
American No. 1. Foundry pig.....	\$49 00	\$50 00	\$58 00	\$53 00
“ No. 2. “ “.....	48 00	49 00	51 00	51 00
“ No. 3. Forge “.....	46 00	46 00	46 00	46 00
“ No. 4. White and mottled	41 00	43 00	49 00	42 00
Scotch pig, (cargo lots for shipment)	47 00	47 00	47 00	47 00
Old rails, D.H.'s, (for shipment here)	58 00	53 00	53 00	53 00 gold } T's 50 cts.
“ “ “ (on spot & for arr'l)	50 00	51 00	51 00	51 00 gold } pr ton less.
No. 1, wrought scrap, (ex. ship).....	54 00	54 00	54 00	50 00 currency.
“ “ “ (shipme't here)	57 50	57 50	57 50	57 50 “
American refined bar, (mill price)....	108 04	108 04	108 04	108 04 “
“ common bar, “ “.....	90 00	90 00	90 00	90 00 “
“ rails, (at mill).....	90 00	90 00	90 00	90 00 “
English rails, (ex. ship, N.Y.).....	75 00	75 00	75 00	75 00 gold.

—**THE “Yankee clock”** was one of the first victories of American manufacture in competition with European work. It simplified the mechanism, reduced the bulk, and produced clocks by wholesale, while England and Germany were content with minute plodding processes. Connecticut is the great centre of American clock-making, and one family—the Thomas family—have been clockmakers more than fifty years. Early in the present century Seth Thomas was one of the pioneers in this branch of mechanical contrivance, and we have to-day Seth Thomas clocks, and Seth Thomas's Sons & Co.'s clocks, which are an array of time-keepers, set in such variety of form and ornamentation, that they are a delight to every lover of artistic beauty. Step by step, the point of cheapness being attained, has the workmanship gained in finish upon the first rude combinations. In addition to mantel clocks, lever clocks, &c., turret or tower clocks, in which France once had the preëminence, are now a creditable example of the manufacturing ability of New York city. Mr. A. S. Hotchkiss, in this line, has a wide-spread reputation.

The American Clock Company, are the sole agents in the United States for the sale of clocks made by six of the largest establishments in Connecticut, viz.: the E. N. Welch Manufacturing Company, New Haven Clock Company, Seth Thomas Clock Company, Welch, Spring & Co., Gilbert Manufacturing Company, Seth Thomas's Sons & Co., and also for the leading styles of other makers, including A. S. Hotchkiss & Co.'s tower clocks, the Ingraham, S. B. Jerome, and Atkins clocks. The New York house is under the man-

agement of Messrs. E. C. Hine and Seth E. Thomas—the latter a grandson of Seth Thomas. The simply leading styles offered by this clock company—mantle clocks, lever clocks, office clocks, regulators and calendars, are 140 patterns—wood, iron, and bronze cases.

The six establishments forenamed have agencies at important points in Europe, and their export trade is large. Probably the combined production is nine-tenths of all the clocks made in this country. The E. N. Welch Manufacturing Company is located at Forestville; the New Haven Clock Company at New Haven; and the Gilbert Manufacturing Company at Winstead, Conn. These three establishments have been in operation 15 years, employ 700 hands in all, and make the styles so universally popular, known as the American clock.

The Seth Thomas Clock Company is located at Thomaston, Conn., and is the oldest establishment of the kind in the country. It was established in 1813. The secretary of the company is Mr. Seth E. Thomas, who is also one of the managers of the consolidated agency in New York.

Among the favorite varieties are the cottage, gothic, and round-top time-pieces; levers of different sizes, strike and alarm; many patterns of the spring strike, some with alarms; the weight strike, extra ornamental; and office clocks and regulators, with calendar; all in various styles of case, and expressly adapted to the requirements of the million, being simple in construction, seldom getting out of order, and sold at prices which are the result of the rule that the more of a thing which is made, the cheaper it can be made, under equal ratio of resources.

The "Seth Thomas clocks" are everywhere held in high estimation, being perhaps the best known of any that are manufactured, and the utmost pains are taken to maintain and increase their reputation. Every clock, before leaving the manufactory, is run and thoroughly tested, and warranted to prove a good time-keeper, if properly used. The patterns are almost endless in variety, and spring, weight, or lever, time or strike, 30-hour or 8-day, ranging from the diminutive 9½-inch "Anchor" to the massive 44-inch regulator. The calendars, regulators, and office clocks combine the advantages of a perfect time-piece, with those of a perpetual and reliable calendar, which shows the day of the week, the month, and the day of the month, (including the 29th of February in leap year,) and requires no other attention than the winding of the time movement. The calendars are finished to order, with the inscriptions upon the dials in French, German, or Spanish.

The factory of Seth Thomas's Sons & Co., also at Thomaston, was established about five years ago for the manufacture of the very finest clock movements that skill can produce. At this establishment French fineness of finish is fully equalled, with greater reliability in time-keeping. Here are made exclusively fine mantel clocks, which require winding but twice monthly, strike the hours and half hours with musical intonation, and tick almost noiselessly. The standards are of French bronze, marble, verde antique, and metal richly gilt, in a great variety of forms.

At this factory also are made fine chronometer lever clocks, expressly for use on locomotives, steamers, or wherever the greatest accuracy of time-keeping is required and a pendulum clock could not be used. The ornamental designs, bronze figures, &c., of Seth Thomas's Sons & Co., are models of chaste artistic conception, whether the design is of rigid simplicity or elaborate in details. These two Thomas works employ about 500 operatives.

Messrs. Welch, Spring & Co., at Forestville, Conn., have been in operation about five years, and employ 100 hands in the production of various styles of clocks, giving especial attention to regulators, calendars, and fine wood case mantel clocks.

Through their New York agency the six concerns named sell \$1,500,000 worth of clocks annually while their export business is about \$1,000,000.

The tower clocks made by A. S. Hotchkiss & Co., are designed for churches, public

buildings, and erection of dial upon sidewalks, connecting with movement inside the buildings. The clock in the city hall, New York, and also many fine clocks in government buildings and public edifices in various parts of the United States are the Hotchkiss make. These giants of the time-marking class are of different sizes, from the seven-inch main wheel, for five foot or less dial (time), to the sixteen-inch main wheel, from any size of dial (strike), and bells upwards of 8,000 pounds.

—"THERE's nothing like leather," was the old song of those who looked over the many uses to which dressed hide could be put. Now we say, there's nothing like paper; and surely paper has claims to rival even iron in the multiplicity of artificial shapes which ever-restless ingenuity contrives; and in its ready susceptibility to the purpose of the user, there is a future anticipated for it, of which the present use is but a faint foreteller.

From papyrus—paper older than history—up to the modern papier-maché, there is a long stretch of time in which the great value of paper was obscured, or perhaps exceptionally and imperfectly conceived in Japan. Comparatively few persons have any idea of the variety or magnitude of its applications even now, or of the many superior qualities it possesses over other material in many manufactures. In Europe it has received considerable attention, and may be found in all the various parts of architecture, from a complete church building in Bavaria (capable of seating 1,000 persons), having columns, walls, altars, roof, and spire of papier-maché, to the finest traceries of a Gothic screen. Some of the most tasteful halls in Britain and on the continent are finished in it, in preference to wood. The mantels, and the mirror frames they support, are of its composition; and strange as it may seem, the very chandeliers, in their gilded elegance, are of this humble material. Its use in architecture can literally have no limit; for no one to-day can say what may not be made of it. In toys, tables, and *bijouterie* of all kinds, we have examples of its extensive uses, and suggestions of future applications: the latest instance is a wheel—carriage or car. Of its own composition, papier-maché never cracks, as wood, plaster, terra-cotta, &c., will do. In the same articles it can be made, if required, far lighter than plaster, terra-cotta, metal, or even wood. Neither heat nor cold affects it; it can be sawed, fitted, nailed or screwed, quickly adjusted or removed, gilded, painted, marbled, or bronzed. It can be made light as cork, or heavy as stone; never discolours by rust, as will iron; is not affected by temperature or oxygen, as is even zinc. It can be made for a given thickness stronger than any white or rare marbles, and is even tougher than slate, quite as hard, and will not chip corners or slab off in strata. Under the American process of preparation its field has been increased. First of all, it is produced very cheaply. In architecture it can be supplied at, or nearly at plaster prices; and taking into consideration the price of putting up, costs no more, and sometimes even less. This depends on the size of the ornament, the larger being cheaper in proportion. Another improvement is in putting on the surface directly in the mould, the putting on of which, after coming from the mould, and the necessary carving, &c., incidental to making the ornament sharp, is the chief cause of expense attending the production in Europe. The American surface, even for the finest purpose, needs scarcely any after-finish. The manner in which this surface is produced also has the effect of bringing out the clearest delineations with the greatest accuracy, and when bronzed, the finest bronze castings are not more perfect. Added to this is increased strength. Upon such surface imitations of the rarest marbles can be produced, as it takes a polish superior even to slate, and costs not half as much as the preparation of plaster of Paris, known as scagliola, and is infinitely stronger. Pedestals, columns, newel-posts, vases, clocks, and multifarious other articles are made in strength and beauty.

Such is the new world of papier-maché. Possibly, when the forests of the globe are regarded as curiosities, and the remaining groves are preserved with the same care that has guarded historic trees, the cast-off rags of mankind, and the otherwise useless weeds, reeds, and grasses of the marsh and swamp, will take the place of timber in construction,

and many will welcome the change if for nothing else than that it will obviate much of the nuisance of frequent repainting.

Philadelphia has a most interesting example of this manufacture at its most advanced stage, in the product of the Parisian Marble Company. Here the operations are under the patent of Mr. Edward S. Judge, and for the carton-pierre and papier-maché work turned out, the claim is put forth that for exterior and interior architectural ornamentation this product is *superior to any other article now in use*; and the proof in support of this claim will be given. Strangers and citizens have one public evidence in this, that all the multiform ornamentation in the "Temple of Pharmacy" in the Continental hotel is made up entirely of this papier-maché, the gilding and encaustic painting being also the fine execution of the superior artists connected with the Parisian Marble Company.

—MANY advantages are claimed for the "dead stroke" power hammer manufactured by Philip S. Justice, of Philadelphia, over any other forging machine known. Its peculiarities are these:—

It strikes a true blow at all times and under all circumstances. Unlike other forging machines, it can be run at a high speed without breaking itself to pieces. Having neither cylinder, valve, nor piston-rod, these fruitful sources of expense in steam and atmospheric hammers are avoided. The ram, or striking part of the hammer, is suspended on an elastic or flexible belt (generally of leather), which, being attached to the extreme points of a semi-circular steel spring, obtains for it the result claimed, to wit: a far more effective blow than is given by any other hammer of the same weight and stroke, and requiring less power.

The stroke varies with the speed, thus accommodating itself to the working of thick and thin metals without alteration. The distance of the crank-pin from the centre of a shaft on a 100-lb. hammer being 4 inches, it will be seen that the throw of the ram, if nothing else were taken into consideration, would be but 8 inches; but, as it has a stroke, independent of the crank-pin, to the same extent when it rises inside of the spring, the actual stroke thus reached is 16 inches when at full speed.

Although none of the force with which the ram descends is lost, the rebound is taken up by the spring and belt on which it is suspended, before reaching the working parts above it. In this way the shaft-bearings, crank-pins, and set-screws are preserved from breakage.

Its convenience is a great point in its favor, as it may be readily adjusted to work exclusively on thick metals, yet for ordinary work a 50-lb. hammer, for example, will strike good alternate blows on a 3-inch or $\frac{3}{4}$ -inch bar without any change in the adjustment. This is readily understood when it is explained that the ram, in ascending, has a stroke inside the spring, into which it rises by the flexibility of the leather belt to which it is attached, and the compression of the points of the spring as the ram is rapidly forced up between them.

A new method has been devised of fitting the crank-pin, by which the stroke can be changed from 8 to 18 inches, thus permitting the same hammer to be run very rapidly on light or heavy work, and combining in one machine a very light or heavy stroke, as desired.

These hammers are used in the government workshops of the United States, France, and Russia, and have been sent to nearly all parts of the United States, England, India, France, Belgium, Holland, Russia, and some of the largest establishments in South America. A prize medal was awarded for it at the exposition of Paris, as well as at the Lowell Mechanic Association.

—A WROUGHT-IRON venetian-blind shutter, now made by the Pennsylvania Wrought Iron Blind Manufacturing Co., of Philadelphia, is worthy of description. It is a patented metallic shutter blind, made up of swinging slats, (each slat being formed of a single piece of sheet metal,) all capable of being adjusted in concert to open or close the blind

—with wider apertures for light, or more complete exclusion of rain, dust, or fire. These slats are formed with a central longitudinal jog, which extends the whole length of the slat, and is at right-angles to the faces; the upper and lower edges of which are turned perpendicularly over in reverse directions so as to form flanges, which, when the slats are closed, lap over each other, and thereby almost entirely prevent any dust or light from passing between them. On the centre of each of the upper flanges is a projection, provided with a hole by which the slats are secured to the rod. The pivots are of a diameter corresponding to the depth of the jog, and are provided with a longitudinal slit in their inner portions which receives the edges of the jog, and are secured from lateral displacement by bearing against the faces of the slats at opposite sides. The rods by which the slats are operated have projections formed on each provided with holes and connected with the projections on the slats by pins passing through the holes and rivetted on the outside. Owing to each of the slats being formed with a jog, when they are closed the blind has the appearance of an ordinary blind with twice the number of slats; and as the slats are a great deal deeper than the ordinary ones, they are pivoted at a greater distance apart, and consequently when opened admit more air and light than the blinds in common use. Formed longitudinally in the slat is a central groove-like bend, which is of a size to fit a rod whose ends form the pivots of the slat, and of a depth to encircle about two-thirds of the circumference of the rod. At suitable intervals throughout the length of this bend, the so-bent portion of the plate is slit or cut across, and the alternate portions bounded by these slits, are bent back in a reverse direction through the groove to form bearings for the other side of the rod, and as the portions between the slits is more than sufficient to encircle the uncovered third, consequently the surplus metal is doubled over to form rib-like projecting folds above and below the centre of the rod, thereby giving additional strength to the slat, and very firmly securing the pivot-rod by stiffening the connections of the loop-like portions with the body of the slat.

—THE decrease of rainfall for the last few years has caused a short supply of water in the wells of rural districts, and in some cases a total failure. This has necessitated the sinking of the wells deeper, and deeper wells require a pump of greater capacity than many of those formerly in use. In this exigency the American Pump Company, of Philadelphia, presents a pump (called the People's Pump) well adapted to general use in localities now affected by failing springs. This pump, designed for either house or outdoor use, is secured to a plank or timber, and is connected by a pipe to the water to be lifted. The plunger-rod, instead of working, as ordinarily, through the top, is operated by a shaft running through the side, to the outer end of which is attached the handle, thus enabling the top to be closed with a hinged lid, and secured by thumb screws, forming an air-chamber for forcing. When this is off, the machine is a simple lift pump; when on, it is converted into a force pump, throwing a continuous stream with considerable power. The spout has two outlets, to one of which may be attached a pipe for conducting water to attics for bathing purposes, &c.; to the other a hose for throwing water in case of fire, for washing carriages, watering gardens, &c.

—Two branches of iron manufacture—stove founding and fine castings—are represented at the Philadelphia establishment of Joseph S. Hibbs & Co. Prominently a stove works, it turns out castings from half an ounce to fifteen tons. Messrs. Hibbs & Co. manufacture snap-flask, loam, dry-sand, and green-sand machinery castings, and every description of gray iron castings. Some of the work of the steamers of the American Steamship Company is now in process at this establishment. In both branches of the manufacture there is the latest and most approved machinery and tools. Their patterns, which are mostly original, have obtained a wide reputation. Fifty men and fifteen boys are employed at these works. The firm, which was established in 1869, has recently completed a new foundry, largely increasing their former facilities. The core oven is one

of the largest in any stove foundry in the United States. The new cupola has a melting capacity of twenty-two tons.

—MR. ELLWOOD MORRIS, civil engineer, has prepared, and Messrs. T. R. Callender & Co., Philadelphia, publish, an octavo work of 189 pages, on the computation of the volumes of earth in embankments, excavations, &c., for the use of engineers, surveyors, and contractors; designed, in part, to correct the errors of arithmetical average. It is entitled *Easy Rules for the Measurement of Earthworks by means of the Prismoidal Formula*—the prism, wedge, and pyramid, regarded as the elementary solids which enter into the composition of a station of earthwork, and separately or together, all computable by the same rule. A table is appended of cubic yards to mean areas in lengths of 100 feet, applied to all mean areas up to 1,000 square feet, and is good as a general table for the conversion of cubic feet into cubic yards.

—PARAFFINE has for some time been proposed as a preservative of wood, and in most of the instances where it has been thus utilized, the wood has been simply immersed in boiling paraffine, which treatment, at best, insures only a superficial coating. An improved process has been suggested by Melchoir Hock, an Austrian, who immerses the wood—previously thoroughly dried—in a solution of paraffine, where it is heated under a pressure of five to eight atmospheres. In this manner the paraffine is forced some distance into the body of the wood, and exerts a much greater preservative action than when merely applied to the surface. After this treatment the solvent—some of the lighter petroleum oils—may be distilled off and used over again.

—IN some instances in the United States and England, the plan of paying employes on Monday instead of Saturday, is on trial. The results have been beneficial. Sunday, instead of being devoted to dissipation, induced by leisure and a pocket full of money, has become a day of healthful recreation and rest; and the week's wages, formerly in great part wasted, have been used to a far better advantage. Under Saturday payments, it often happens that first-class workmen lose from one to three days early in the week in recovering from their Sunday debauch. Not only do Monday payments increase the hours of actual work, but the product is enhanced by reason of the superior condition of the workmen.

—THE Cotton Manufacturing Association states that during the cotton year ending August 31, the United States consumed in 1870, 867,500 bales, of which the North took 780,000 and the South 17,000. In 1871 the total consumption was 1,042,000, of which the North took 946,000 and the South 96,000. It is also said that the rate for 1872 will be yet larger in the northern mills, should there be no deficiency in water power. The spinning capacity is enlarged 5 to 7 per cent. There is a fair but moderate average profit in the business at current prices for cotton. Every mill will work full under these conditions.

—THE real effect of the eight-hour movement, so far, has been towards annulling the whole plan of day's-work, and the substitution in its place of the single-hour system. We think that the latter system will be found in the end more satisfactory to both employer and employed. More equitable to both, it will leave negotiations between the respective parties to their individual arrangement, with less opportunity for outside intermeddling.

—ACCORDING to a number of experiments recently made by the London Chemical Society, the best mode of determining carbon in iron is by direct burning in a stream of oxygen. A great variety of tests proved, it is said, this process to be at once the most accurate and expeditious.

—THE steel-headed rails have been found, on trial by the engineer of the Reading railroad, to separate at the welds to an extent of twenty-five per cent. of the rails laid down.

MONETARY.

WE come to the summer solstice with a putting aside of all extra disturbing elements of the courses of commerce and money. The Geneva conference has been followed in its turnings, alternately weakening and strengthening gold and exchange, until the matter has about reached its level. Stock speculations are held in abeyance, not only from the influence of summer stagnation, but from the puzzle offered by present range of prices—the attempts to solve which are delightfully wearing on the brain. The banks exhibited in the fore part of June a condition which suggests more activity in trade than at the stock exchanges, increase of loans not being attended with increase of deposits. Towards the close of the month, deposits increased to meet July payments.

There are signs that the presidential election contest, now about beginning, will involve more considerations relative to business and financial topics than any like election. A huge national bank scheme in New York has been postponed for the present, for one, among other reasons, that a change in the presidency might bring about a system of opposition to the banks.

—Sales of Stocks, etc., at New York.

	June 10.	June 17.	June 24.	July 1.
U. S. 6's, coupon, 1881.....	120½	120	119½	117
“ 5-20's, coupon, 1862.....	114½	114½	114	114½
“ 5-20's, coupon, 1864.....	114½	114½	114	114½
“ 5-20's, coupon, 1865, m & n.....	115½	115	114½	115½
“ 5-20's, coupon, 1865, j & jy.....	117½	116½	116	*118½
“ 5-20's, coupon, 1867.....	117½	117½	117½	*115½
“ 5-20's, coupon, 1868.....	117½	117½	117½	114½
“ 10-40's, coupon.....	112½	111½	111	112½
Pacific 6's, currency.....	114½	114½	114½	114½
Tennessee 6's.....	72½	78	72½	74
“ 6's, new.....	72½	78	72½	74
North Carolina 6's.....	81½	82½	....	84
“ 6's, new.....	21	....	....	21
Missouri 6's.....	97	97½	97½	*94½
N. Y. Central and Hudson R. con.....	97½	96½	97½	97½
Harlem.....	120	120	115½	115½
Erie.....	61½	57½	57½	56½
“ preferred.....	....	....	....	....
Lake Shore and Michigan Southern.....	95½	95½	96½	96½
Wabash.....	76½	75½	75½	75½
Cleveland & Pittsburgh.....	91½	....	....	....
Northwestern.....	73	70½	78	72½
“ preferred.....	94½	90½	90½	90½
Rock Island.....	110½	109½	110½	111
Fort Wayne.....	98	98	....	96½
Milwaukee and St. Paul.....	56½	52½	53½	53½
“ “ preferred.....	78½	77½	77½	77
Ohio and Mississippi.....	46½	44½	45½	46½
New Jersey Central.....	....	109½	109½	....
Western Union Telegraph.....	76½	75	75	75
Pacific Mail.....	75½	68½	73½	78½
Union Pacific.....	89½	87	87½	87½

	June 10.	June 17.	June 24.	July 1.
Adams Express	98	97½	97½	....
Wells, Fargo & Co. Express.....	....	90	89½	....
American Merchants Union Ex.....	79	....	....	↑74
United States Express.....	85½	87½	87	....
Rate for Money.....	5	5@5½	5	4@5

Sales of Stocks, etc., at Philadelphia.

Gold.....	114½	118½	118½	118½
Sterling exchange.....	125½	....	124½	124½
Paris exchange.....	4.55	....	4.61	4.54
Lehigh Valley Railroad.....	60	60½	60½	59½
" " 6's.....	96½	96	96	96
" " 7's, reg.....	105	105	105	105½
Lehigh Navigation.....	....	44½	44½	43½
" " 6's, 1884.....	91	92	90½	....
" " 6's, g. in.....	96½	93	93½	93½
" " 6's, R.....	94½	95	95½	96
City 6's, no tax.....	99½	100	100	100½
" tax.....	96½	96½	96½	96½
Pennsylvania Railroad.....	59½	59½	59½	59
" " 6's, 1m.....	101½	102	102½	*99½
" " 6's, 2m.....	97½	97	....	....
Pennsylvania 6's, w. in.....	....	....	....	....
" " 6's, first ser.....	103	103	102	102
" " 6's, second ser.....	106	106½	106½	*103½
" " 6's, third ser.....	108½	109	109	*106
" " 5's, cp.....	....	....	....	....
Reading Railroad.....	60½	61½	61½	61½
" " 6's, mt.....	....	98½	99	*96
" " 7's.....	102	103½	103½	....
Catawissa Railroad.....	....	....	16	....
" " preferred.....	46½	45	45½	45
New York and Middle.....	....	....	....	....
North Pennsylvania R. R.....	50½	50	50	50
" " 6's, mt.....	102	102½	102½	↑99½
" " 7's, mt.....	96½	96½	97	97
" " 10's, chat.....	110	....	....	110
United New Jersey Companies.....	....	128	128½	↑126
" " " 6's, mt, 1889.....	....	96	96½	96
" " " 6's, 1888.....	....	92	92	92½
" " " 6's, 1889.....	....	....	90½	90½
West Jersey Railroad 6's.....	94½	95	95	↑90½
" " 7's.....	102	102	102	102
Philadelphia and Erie.....	28½	28	27½	27½
" " 6's.....	89½	90	90	90½
Allegheny County, 5 cp.....	....	....	78	*75
Schuylkill Navigation.....	7½	....	7½	....
" " preferred.....	15½	15½	15½	15½
" " 6's, 1882.....	80½	81	78	78½
Morris Canal.....	50½	....	....	....
" " preferred.....	125	126½	127	127
" " 6's, 1882.....	94	94	93	93
Little Schuylkill Railroad.....	47½	48	48	48½
Oil Ck. and Al. R.....	40½	39½	39	37
" " 7's.....	79½	79½	79	79½
Phila., Ger., and Nor. R. R.....	88	88	87	87
Minehill Railroad.....	54	54½	54½	54½
Elmira and Williamsport, preferred.....	42	42	42	42
" " " 7's.....	96	97	97	....
" " " 5's.....	59	59½	59	59½
Northern Central.....	....	39	39	39
Fulton Coal.....	5	....	....	5
Rate for Money.....	6	6	5@5½	5@5½

NOTING AND COMMENTING.

THE principal event of the month has been the adjustment of the disagreement between England and the United States in reference to the ever-recurring "indirect damages." In some way, that has not as yet transpired, the question of their admissibility was placed before the arbitrators, without, it would seem, committing Great Britain to obey their decision, and has been decided by them adversely to the United States. The diplomatic confusion that has arisen upon this subject has covered this part of the arbitration with such dense obscurity that we cannot as yet see the precise effect of the decision. But it would seem clear that the United States pressed the claims only as a matter of form, and without any real expectation of their recovery—a sort of abstract principle without a pecuniary element. The propriety of asking for what we thought we would not get, and knew we were not entitled to, is an open question.

The ballot bill passed in the house of commons to its third reading June 25th. It is not anticipated that the lords will venture to express their well-known opposition to the measure—the recollection of their treatment in the last session upon the army bill being still fresh and impressive with them.

The great building strike in London continues, and shows no signs of flagging, and the press is calling upon the workmen to remember "old England" and be patriotic. The Cobden club has determined to issue a call for an international convention for the discussion of free trade both on the continent and in this country.

The details, just coming in, of the recent flood near Prague, in the latter part of May, show the destruction of life and property to have been very great. As many as seven hundred persons were drowned, and a large number of villages entirely swept away.

In Germany the struggle between the Jesuits and the government has been ended, for the present at least, by the approval by the federal council of the bill proscribing Jesuits as a class. The pope has expressed himself with great bitterness upon what he calls the "persecution of Catholics," and the feeling is becoming general that Prince Bismarck has pushed his measures too far—if not for success, at least for decency.

Just now, however, the government is too absolute in its power to be either thwarted or restrained. The prestige gained in the late war has been translated into the practical form of money—and money in such abundance that it will not be difficult for some time to come to buy votes for any measure the prince may wish. The entire amount received from France is estimated by the London Economist at not less than \$1,400,000,000, and if from this we deduct the total of all expenses of the war—about \$277,500,000—we have a net profit, as shopkeepers say, of \$1,122,500,000; or, in other words, Germany has got back her principal and upwards of 500 per cent. interest.

On the 11th ult., the German men of war at Port au Prince took forcible possession of two Haytian corvettes as security for the indemnification for the late outrages. There seems to have been no blood shed, and the incident is only noteworthy as a flagrant violation of international law.

France is still straining every nerve to rid herself of foreign soldiery. The proposed agreement anticipating the payments of the indemnity moneys and the evacuation of the territory still held by the Germans, has not as yet been signed, but the general terms of such a policy, it is believed, have been agreed upon. They provide for the payment of a milliard of francs upon the 15th of February, 1873, and the same amount within the year 1873, and again in 1874, with the right on the part of France to anticipate these payments.

There has been another misunderstanding between President Thiers and his party. The members of the right, to the number of 350, have determined to leave the president entirely in the hands of the left for support. The ministers tendered their resignations, but, with the exception of M. Laley, head of the department of the public works, withdrew them. Although a ministerial crisis is again confidently looked for, it is more than probable that an amicable settlement of the differences, which are apparently personal rather than political, will be arrived at.

Our affairs with Spain have a more pacific appearance than they possessed last month. It appears that the United States did not demand

the liberation of Dr. Houard on the ground of his American citizenship, but only upon general principles of humanity; that on these grounds the Spanish government has consented to his release. It is eagerly denied by the Madrid press that the government had requested the recall of Gen. Sickles. Senor Zorilla's acceptance of the premiership has had a generally tranquillizing effect upon the people. The partial risings of the republicans in Andalusia, and the discontent of the conservatives at the rejection by the king of their proposals, do not seem to be of much importance. The Carlist insurrection is practically at an end. The circular letter of the new president is admirable in purpose and expression, and promises to the colonies constitutions and reforms as soon as the domestic affairs of the kingdom are more settled.

The lower house of the Italian government has passed a bill abolishing all theological chairs in the State universities. The object of the measure, to divide Church and State, is perhaps a wise one; but the measure is open to many grave objections. It is curious that Italy should be the first nation to take religion away from the circle of sciences. It is understood that the government supports the bill, and will press it in the senate; so that its passage is secured.

From Mexico we have advices of the never-ending intestine wars of that unhappy country, but without anything of marked importance. Portual is operating outside of Matamoros, and levying 25 per cent. on all goods leaving the city. Saltillo has been captured by Trevino. Gen. Ceballos is at Camargo, and is said to be operating with Rochoa. Quiroga, the revolutionist, is estimated to have under him over 8,000 troops—a larger number than the combined forces of Rochoa and Ceballos.

—To the compendiums of useful information produced under the editorship of Dr. Colange, there is now to be added The National Encyclopedia, issued by the National Encyclopedia Publishing Co. of New York. H. Desilver, general agent, Philadelphia. Three numbers of the complete series of 18 royal octavo numbers are before us, and their contents indicate that when the work is finished, it will be an expository index of the circle of sciences, revised down to the latest developments of 1872. For ability of condensed statement, Dr. Colange has no superior, and in this encyclopedic lexicon we have the results of his farthest investigations and studies, and the ripe fruit of his most disciplined skill as a compiler. First, the new encyclopedia is a catalogue of facts and ideas, rather than words, and serves excellently as a sequel to Worcester and Webster. It is no mere compilation of other dictionaries, but rather an abstrait of the latest library of general information. As a polytechnic expositor it is admirable. There is a good range of biography, commerce, and economics, as also professional terminology. For the latest discovery in archæ-

ology, as for the newest development in thought-upsetting zoology, there is a note.

—THE new postal code adopted by congress makes many changes in the law as it formerly stood. According to the new code, the branch post-offices in large cities are made money-order offices, and the fee for money-orders of \$10 or less is reduced from ten to five cents. A married woman is allowed to act as postmaster, and she is declared to be a *feme sole* as to her official acts. Letters between post-offices not over three miles apart, may, at the discretion of the postmaster-general, be dispatched to their destination, though only partially prepaid with a two-cent stamp, and the amount due is to be collected on delivery. Transient newspapers are to be hereafter sent at the rate of one cent for two ounces, instead of two cents for four ounces or under. Clothing for non-commissioned officers and privates in the U. S. service may be transmitted through the mails at one cent per ounce. Private boxes for the reception of mail matter may be placed by individuals in post-offices. One-cent postal cards like those in use in Great Britain, are authorized, and the price of the card and of the stamp will be one cent.

—THE report of the inspectors of steamboats in the United States shows that during the four years ending December 31, 1871, the casualties to steamboats amounted to 533, of which 139 were by sinking, 151 by fire, 87 by collision, 56 by explosion, and 43 wrecks. On the Atlantic coast 102 casualties occurred, of which 38 were by fire, 31 by collision, 18 by explosion, and 2 by wrecks. On the lakes 69 casualties occurred, of which 23 were by fire, 17 by collision, 9 by explosion, 17 by wrecks, and 3 by sinking. On the Pacific coast there were 18 casualties, of which 8 were by wreck, 4 by explosion, and 3 by fire. The loss of life from these 533 casualties amounted to 1,473 lives, 556 being destroyed by fire, 465 by wreck, 399 by explosion, 80 by collision, and 33 by sinking.

—THE American Newspaper Directory for 1872, published by Messrs. Geo. P. Rowell & Co., exceeds by more than 100 pages the directory of 1871, and is a striking proof of the enterprise and resources of the establishment issuing it. Total journals from daily to quarterly, 1872: United States and British provinces, 6,382, against 6,438 in 1871. Total, United States, 1871, 5,983; 1872, 6,432. Of this increase of 449, nearly all, viz., 420, was in the weeklies, which represent 77 per cent. of "the press" of the country. The dailies decreased 74, the monthlies increased 9. The greatest newspaper States, in the order of their supremacy, are New York, Pennsylvania, Illinois, Ohio, Iowa, Missouri, Massachusetts, and Indiana.

—STATISTICS of the exports and imports of the United States for the past eight months of the present year show the United States as a buyer of \$52,000,000 of foreign goods in excess of our foreign export sales.

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EDUCATION.

IT is not a little presumptuous for one who has had little experience and little knowledge of special methods of education to attempt to say anything new upon a subject which has been discussed so long and so often. But, during a revolution, unconcerned observers may judge better of the character of the changes occurring than the contestants themselves, and ours is an age of revolution—in education as well as in politics and natural science. In these last the change is unmistakeably progress. Numberless wild theories are proposed, but fail to be adopted or put into practice. But in education new methods are practiced in bewildering variety as fast as conceived. This would not be so unfortunate if they could be tried on insentient organisms, instead of precious human material, much of which must be wasted and destroyed in these experiments. Nevertheless, the changes are doubtless, on the whole, for good. The old scholastic notion of education, in the narrow sense of mere learning, has given place to larger views, which comprehend plans for the perfecting of every part of man.

Yet education is still commonly considered as something extraneous to be added to the subject of it, or an influence from without, by which he is to be moulded like clay. This is the way to deal with inert substances. But man becomes man by growth, and needs most to be permitted to develop freely; only abnormal and diseased growth being checked, and such as might conflict with his present disordered circum-

stances. To promote this growth let there be given whatever physical, mental, or spiritual elements it craves; taking care that none be lacking, and avoiding the frequent error of cramming any kind of food against the appetite. Whatever good shall be thus developed will be living, like the leaven that leavens the whole lump. But it will be said that this presupposes a good disposition as a basis. We shall see about that hereafter. Let us admit, however, that children are naturally bad, and more liable to go wrong than right. The old way of dealing with this evil was mainly by means of repression. The fire was kept smothered until maturity. There was also a character to be formed, which should endure for life. This was to be made mostly of habits. Some said: "Man is a bundle of habits;" and truly their methods tended to make him so. In so far as they succeeded, they deprived man of the quality of a moral being, and made him a machine. Such machines are very respectable in appearance, and, by reason of their habitual conformity to social usages, are irreproachable members of society. But character is not a thing of habit: it lies deeper. Habits are ruts worn by repeated action, which guide the wheels, and at the same time interfere with their free course. They relieve the will of direct attention to many little things, but sometimes usurp its place in crises of greater moment; and in all cases, so far as their action extends, are a negation of moral character.

Education in the sense of a drawing out of certain faculties is now much insisted upon. This is apparently the original meaning of the word. Whether it is, or not, matters little. The power of attention, memory, and logical reasoning are especially sought to be developed; and they often are developed to such an extent that the rest of the man is dwarfed and enfeebled, and he only fit for a professor of certain specialities. The one means by which this development is sought to be produced is exercise. The process frequently fails by reason of this restriction, and the whole man is weakened and destroyed; not excepting the specially exercised faculties. In itself, exercise is not strengthening; it rather weakens, and so indicates the need of, and induces, increased recuperative action during rest. A simple analogous case is the thickening of the skin of a workman's hand. The direct effect of the work is to wear away the skin; but this is followed by a slight inflammation, indicating an increased production of tissue, and, if the intervals of rest are not too short, what was abraded is more than replaced. So, too, with the worn-out muscles and brain; and, so perhaps, with the subtler essence of mind itself: for, though mind were but organized force, yet, since force has been found to be as real and indestructible as ponderable matter, the exhausted mind may need to be renewed, as

much as its material basis—just as the bodily heat and corporal particles are affected by a like flux. The mind is not directly strengthened, but weakened, not restored, but exhausted by exercise; but the loss is recovered through rest, as the body is chilled by a cold bath, but glows with heat in the reaction which follows. Either, continued too long, may prevent the reaction and leave only the direct chilling or weakening effects. Long-continued exertion in pursuit of knowledge has thus had its due effect in the production of a horde of bloodless weaklings—too eager votaries of science. Of late, there has been less of this abnormal development of intellect at the expense of the whole being, and a somewhat more vigorous race of scholars has been the result.

Besides mere learning and education in the sense of a drawing out, both of these have the support of discipline—training—drill—a kind of mental and moral gymnastics, which combines the suppression of much that is natural with the formation of artificial habits and manners; so that inherent faults do not find expression in action. The corrupt tree does not bear evil fruit, because it is kept pruned down, so as to bear none except upon branches artificially grafted in. This is better than the unrestricted growth of an originally bad stock; but when the care and restraint of discipline ceases, such a one is apt to sprout out into untoward wildness—or, if not, is maimed for life by his artificial habits and manners, and resulting affectations. Drill is good, and restraint is good for the correction of faults, and so are prisons; but they are necessary evils, only to be used in default of other methods.

What is called education is mainly made up of these three—discipline, mere learning, and the drawing out process. Now we would not disparage nor dispense with any of them. They are all of use; but alone they are only capable of making a manikin, not a man. Man grows—grows physically, mentally, and morally, and becomes a perfect man, only as this growth is fed from without, and not interfered with nor marred by internal defects, or external want or injury. Neither is it well to change the individual type of growth into accordance with some general standard, any more than it is to shape the form and features, as is done by Flathead Indians and some ladies of fashion. Such attempts to improve the physical man are more evidently absurd, but not more really so, than like attempts upon his intellectual and moral nature, and are much less injurious, because of being few and limited in their scope.

Let us make a hasty examination of what it is proposed to improve. First, is attention, which the pupil is instructed to keep fixed by direct effort of will. But this is not nature's method. The will is not capable of a continuous strain, any more than the muscles, and it can only be

attempted with pain and great waste of energy. What is needed is a direct appetency of the faculty for the subject of its action, and freedom from the distracting importunities of irrelevant matters. The best way to avoid irrelevant thoughts or cares is to attend to them beforehand; and then the mind at ease will be steadily directed to its subject, there being nothing to draw it aside. But if aught should draw it aside, it should ever be ready to deflect at once in attention to the new call. Often there is too great fixedness of attention, especially for the purposes of practical life; and even in study it is apt to result in narrow-mindedness, through inadvertence to related subjects. When thoughts of such intrude, it is generally not in vain; and, in entertaining them, we sometimes entertain angels unawares. Some of our best thoughts enter thus, and if we give them no attention, they are apt to flit away forever. This is the mental attitude of a class of thinkers whose most perfect production was the fruitless system of scholastic philosophy. We have some such still in the world, but not of it; nor yet above it, though they may think so. Opposed to it is that of the man of business, who is not disconcerted by frequent interruptions in the midst of his most important affairs, and whose ready mind is as mobile as the apple of his eye.

After attention, come conception and memory, which we shall treat together, because alike affected by a serious practical mistake of most teachers, this: That the mind should assume its notion of a subject in the shape in which it is presented in the lecture or the treatise studied. It was remarked as a special merit of a certain preacher, that one of his sermons could be carried away in the mind of the hearer, as if its different parts were joined together into one piece. Many learners encumber their minds by just such logical joiner-work. But this is not how the mind naturally assimilates knowledge. A frame or skeleton is needed; but it should grow in the mind as the principles of which it is composed are perceived, not be thrust in ready-made: else, besides other disadvantages, we are apt to have a separate skeleton for each class of subjects; the general principles which run through all, or many of them, being broken into fragments, in which their general scope cannot be seen. Worse still, these ready-made systems are commonly mere classifications of facts according to some one principle, on which they are strung in linear order; very helpful, indeed, to the memory, as a rosary is, but regardless of the many principles ramifying in all directions, which affect some of the facts more importantly than the one principle according to which they are classified. A verbal description is like a line, in that its parts can only follow each other; it is analogous to space of one dimension. But the mind comprehends at once relations of many kinds,

reaching in every direction, and readily conceives of a system of truth too complicated for a single verbal description. Complete knowledge of no subject, except of naked mathematical truth, can be derived from a single account. First, we get a starting-point in a little concrete knowledge, to which new facts attach themselves as learned; enough is added to embody some general principles; on these, betimes, more and divers facts settle, filling out the deficiencies in our idea of the whole subject; until at last it approximates to a likeness to the objective reality. Unity of conceptions and due order and distinction in the mind, independently of verbal description, are prime requisites to the gradual completion of our knowledge of any subject. He who has thus builded the temple of his knowledge will find it to be a living temple, variable according to his wants, and to the elements from without, by which they are supplied. Nay, more; there will be a constant instinctive tendency to the completion of each branch of knowledge, as there is a tendency to the perfection of each branch of a tree. Thus a multitude of details, too numerous to be remembered singly, coalesce into one idea, which we may call to mind in its completeness, as readily as we recollect an absent friend. We do not think such thoughts in words. A thousand words would not compass one of them. Words will do for markers, like stakes at the angles of a plot of land, or they may suggest to the mind conceptions which they are inadequate to express; but, outside of logic and mathematics, and some simple principles, they are poor, weak, inadequate things, better out of our thoughts whenever we can conceive of things and their relations without them. New truths are commonly thought out so, and clothe themselves in words afterwards. Those who depend upon others for their ready-made systems of knowledge, classified, as we have said, linearly, according to some one principle, must of course receive them encased in words; and when so received, the packages most often remain unopened, with only the words to mark what they are. Let us rather tear off the verbal envelope, and put each new notion where it belongs; and we shall find that it will not crowd out any other—for each fits and fills its own place in a just conception of the outward reality, and, as it helps to complete the idea, makes it easier to conceive and to remember.

Fortunately, little endeavor is used to cultivate the imagination, and that faculty is left to act naturally. Her truth-seeking sister, Reason, is also less cruelly drilled than formerly. Not many years ago reason was exalted to an undue supremacy over other faculties—to a height that left her as cold and incapable of action as if perched on a frozen peak; for the ministration and coöperation of the other faculties are as necessary, as the support of the various corporal organs is to the brain.

Reason alone, especially reason reasoning in words, unless along mathematical lines, can scarcely make three steps without a misstep. Witness how the lack of but one of the lowest feelings of our nature—the sexual sentiment—in certain notorious strong-minded women invalidates their arguments. Or, let anyone venture out into a subject new to him, by a series of syllogisms, and see how soon he will be astray. He will be glad to return to his premises and look over the subject unsystematically; and then, if he understands it, he may lay it off in syllogisms for stepping-stones for others, and greatly congratulate himself if he gets them rightly placed. Mere logical reasoning is like a flight of steps built of irregular blocks, (for words are such,) and needs the support of the other faculties of the soul—not of the mind only, but of the feelings as well. So thought the great whole-souled thinkers of the Elizabethan age—Shakspeare, Bacon, Milton, and the rest—and so built high above the many careful artists of the next century, whose heartless intellects worked by rule. Not that rules should be abolished altogether. No substitute as good can be had for those that are conventional and arbitrary. Some of them, too, are necessary expressions of underlying principles too recondite to be borne in mind as principles. But when a realizing sense of the principle involved is possible, (and it generally is,) it is better to be governed by that sense, than to be constantly referring to the rule. Instance the difference between inbred politeness and the stiff manner which results from the conscious observance of the rules of etiquette. We have not made this matter very clear, but it may be briefly summed up in this maxim: “Think with your whole soul; act with your whole being.” Then shall your weakness be stronger than the strength of him who thinks the automatic action of one faculty sufficient for the attainment of truth, or the accomplishment of any good.

The advantages of special training, in preparation for the special occupations in which most men’s lives are spent, and the greatly increased efficiency accompanying skill, have led to the belief that analogous culture of all our powers is needful. We even hear of the necessity of cultivating the affections, and some even propose to school our highest and most sacred emotions; only those which we have in common with the brutes being passed over as incapable of improvement. They argue that, as the feelings are more important than the intellect, their culture is more needful; forgetting to inquire whether they can be improved in this way. This is like the argument in favor of teaching the affairs of common daily life in preference to the classics, because the former are of more practical importance; whereas these things come of themselves in the course of life, while classical knowledge, which fur-

nishes the key to modern thought and language, if neglected in youth, leaves man shut out from some of the richest fields of wisdom. Herein is one of the fallacies of "object lessons;" they teach things formally that cannot but be learned anyhow in childhood, if they have not already been learned. Not what is most important merely, but that which is necessarily preliminary, or which cannot be acquired in after-life, should be learned in school. Some of our newer colleges would include both by attempting to teach all possible subjects, especially the so-called useful; but their course is likely to be as shallow as that of a river which spreads itself with rapid current over too wide a channel.

But there is a culture which asserts its incommensurable superiority over these, and assumes to elevate its votaries into a region of "calm and sweetness and light," and to regard those on the common plane of humanity as "Philistines," unfit to be admitted to their high privileges. To attain to this state, the gross but necessary elements of human nature are subdued or eliminated, and the now bleached and emasculated intellect is ready to view with a keen and cold regard, the tumults of passion in hearts which still throb out red blood. Their culture is mostly negative, but partly cumulative and partly the assumption of certain abstract principles, generally secondary to unseen first principles and real motives, by a relation, of which they are not cognizant. Trace up their real reasons for avoiding what is base and injurious, and they will commonly be found in pride and self-love. Goethe was the great personal exemplar of this culture, but it was reserved for Matthew Arnold to promulgate shamelessly its false virtues in their nakedness and heartlessness.

This is accounted by many the highest development of modern culture; but above it and every other we would place the natural method, which begins from within and works outward—an outgrowth from the heart, guided and ministered to by the intellect, drawing its sustenance by a natural appetency from the elements without; which must necessarily be consistent and symmetrical in form, and agree in quality, good or bad, with the heart whence it sprang. "Out of the heart are the issues of life." Here we are at the root of the whole matter. If it be naturally bad, no repression, no culture, no learning will cure it. Christianity alone, of all systems of religion, morals, or philosophy, has grasped this problem, and claims to have solved it. If so, its truth and efficacy are demonstrated. But, whether by the means which the word "faith" inadequately expresses to many minds, or whether by taking advantage of the health and innocence of the infant mind, let us, in discussing the methods of education, assume the existence of a class in which right feeling and purpose predominate, besides the undoubted

class of opposite character. As these classes are mixed together at our schools and colleges, the whole system of discipline has been adapted to the last and least deserving; and all are subjected to it as if alike needing to be driven along the right road—a discipline which tends to make all alike resist the compulsion which forces them to conform to right rules; while the earnest and eager are reined back to suit the reluctant pace of others. The writer has thus been one of a majority of earnest students who were galled and hampered by restrictions and requisitions which benefited but a small minority of *mauvaises sujets*, if indeed they were bettered by them. This is a part of the working of the general system of using external means to force the young into accordance with certain standards of excellence—a system upon which millions of parents have acted in all ages. The greater freedom allowed in the German universities has borne such fruits of manliness and self-control and independent thought, as should satisfy all but those who disbelieve in mental freedom.

But shall there be no discipline for the perverse and contumacious? Yes, truly; but let them not be the occasion of putting a yoke on the shoulders of all. Or, if that cannot be avoided when all are taught in common, expel the worst, and put them where they will not be nuisances to their betters, and where they will have the benefit of the strong government which is suitable to their characters. We want a system of education for the best, not for the worst; free, and with full scope for the development of individual character and capabilities; and to that end governed little by arbitrary rules, but guided more than ever by the example and sympathizing counsels of such teachers as are wise enough to advise. Willing students want guidance, not discipline; oftener want cautions to less exertions than the constant stimulus by which they are now influenced. The worst of this stimulus is that it is not legitimate; *i. e.*, it is applied to irrelevant motives. A generous and healthy enthusiasm for knowledge is superseded by appeals to emulation or other motives, which force the mind into action for which it has no immediate desire, and which is neither pleasurable, wholesome, nor useful, and often, positively injurious. A few hours of enthusiastic search for truth in the love of it are worth more every way, than a week of study induced by other means. The intense curiosity of early childhood is of like avail, and so is their natural playfulness; but here many teachers and parents err, on the other hand, by themselves making a play of study, instead of leaving that to be done spontaneously by the child. Factitious means fail in almost everything that is not itself artificial and arbitrary.

Along with such enthusiasms our college courses tend to repress and

smother those pregnant generalities, vaguely seen at first, but becoming clearer as they gather assimilated facts and grow into systems of truth, native to the mind, and living and growing with it. A chemical product in its nascent state, just as it springs into its new existence, has stronger and peculiar affinities, causing it to lay hold on surrounding elements, to which it is afterward indifferent. So newly-learned truth combines keenly with our previous knowledge, in analogies and syntheses, which would not be spontaneously formed when it becomes stale. These should be followed out at once while fresh; afterward they may be judged of coolly. One just generalization well followed out, whether it be original or not, is better than a multitude of the fragments of systems with which students' minds are often cumbered, the *debris* of their studies of skeleton text-books, in preparation for recitation and examination. So long as the system of study for recitation is maintained, so long will such meagre text-books be necessary. When the most pressing motive in the student's mind is anxiety to pass examination, he almost inevitably tries only to prepare for that. His learning sinks no deeper than the memory, and quickly dies out, like the seed sown on stony ground. This is the great vice of nearly all our educational institutions—an intrusive, illegitimate motive of study, which begets a bastard, pedantic learning, or that which is weak and abortive, instead of the healthy and progressive growth which results from an earnest desire of knowledge. More disastrous still are the effects on the moral character of the student, of this substitution of a false for a true purpose. It vitiates the whole process of education, through which the student basely crawls, watching for the trifling incentives strewn in his path, instead of walking unmindful of them, with his attention directed to the true ends of life.

More freedom, and the discarding of such unmanly incentives to exertion, will do away with this evil; but the closely-connected one of study by rote is not so easily dispatched. So long as the system of recitations is kept up, text-books must be very like what they are—mere skeletons of their subjects, without flesh or life; for, if their outlines are filled up, pupils who study merely to recite, will batten on the easy and less essential parts, to the neglect of the more difficult and important general principles. This problem is practically solved in the German universities, but by a method that leaves other wants unsupplied. The student there studies to learn, not to recite; but he has less of the personal influence and aid and guidance of his teacher, which, with an earnest purpose and love of knowledge on the part of pupil, are chief requisites to a successful course of study. Most young men, we believe, enter our colleges with such motives; and to them, as we said before,

and not to the undeserving minority who are forced into them, should their methods be adapted. There is still a small third class who cannot see the use of what they study. So long as they cannot, it is of but little use. These need counsel more than constraint; and, if that avails not, they had better be remanded to other occupations, the purposes of which are more manifest. Certain subjects also seem superfluous to some. When they do, they may generally be better neglected in favor of favorite studies, than studied unwillingly.

The bad effects of the system of forcing have, of late, become so evident that some have proposed to reduce the hours of study to but three a day, or fifteen a week. But the evils complained of rarely result when the pursuit of knowledge is spontaneous, and for its own sake, unless carried to excess or under unnatural conditions. Willing and pleasurable study, where these are not, is healthful and innocuous as play. Undue stimulus, unnecessary and irksome requirements, artificial and complex methods, and unnatural surroundings—these are what change the invigorating influence of wholesome study into a bane. Discard these for the simplicity of nature, and, while your school will make less of a show, your scholars will make better progress, and leave it fitter for whatever they shall have to do in life.

Yet another cause for disrelish for study is the poor quality of most text-books now in use. Among the many thousands, produced as speculations by poor authors and scheming publishers, few are equal in style to older treatises now obsolete. A volume is now quickly produced, which formerly would have been the work of years. These unfinished works, of course, are rough roads for young feet to travel. Easy writing is hard reading; and much hard study has resulted from the slovenly composition of text-books. Language which is to be impressed on young minds for life should be an example to them of all possible excellencies. But the language of most text-books is inferior to even that of a leading newspaper, which is written to be read one day and forgotten the next.

We have deprecated undue stimulus. Sometimes there is an excess of that which is legitimate, but commonly this will be found to be only apparent, and the excess to be really due to emulation or other motives. But, whatever the motive, the mind will be able to do more and last longer when not overstrained. Machinery fails rapidly when worked to its full capacity; engineers load their structures to but a fraction of their ultimate strength, and the mind should be dealt with in like manner. But when relieved of all but a moderate load, the young mind is apt to assume others instead, equally crushing, though mostly frivolous and apparently too light to injure—minor dissipations of intel-

lect and feeling, less hurtful in degree only than those of after life. This tendency is thought to be best counteracted by good habits; but a right disposition, in which they should be rooted, is precedent to them. Love of good alone can prevent the choice of evil in the employment of the time and vigor which should be spared from active exertion and given to rest and recuperation. The quiet which best strengthens and renews can only come from the right and harmonious action of our whole being. And here we would add our testimony as to the benefit of uniting the rest of two nights by a Sabbath unbroken by exertion or excitement of feeling, so that recuperative operations, which could not be completed in a few hours, should not be broken off, but have the whole period for their completion. We overworked Americans should likewise be chary of breaking into periods of lassitude; for that is the feeling which attends recuperation, and it should not be interfered with, unless for important reasons. Oftenest, however, we dissipate the feeling of lassitude and check recuperation by coffee or a stronger stimulant, and set our human machinery at work again before repairs are completed, and while it is partly dismantled and encumbered with unrecovered worn-out material. Six hours a day of well-directed and willing study is not too much, if the intervals of recreation are not misused; and if not irksome, a healthy youth with no vices may, without injury, frequently protract his studies to ten hours or more. In this, too, rigid rules will not serve so well as suitable counsel. The stimulus of illegitimate motives apart, the chief danger here to be guarded against is a certain exaltation of mind, which makes its most intense actions seem easy, but which is really incipient madness. Exhaustion, on the other hand, is not so insidious in its approach, and cannot be hurtful if the student will but cease study when it becomes a task. In most of our colleges this would interfere with the regular course—another evil of their rigid system.

Most parents will meet arguments in favor of a freer system with the question, "Is it safe?" Not so safe, perhaps, as the old thralldom, while it lasted, but much safer in after life, and vastly more beneficial to those to whom it is safe. The effect is analogous to that of the free social intercourse allowed here and in England to young women. To some it is ruin; but in most it results in a modest and virtuous character, superior to the sickly products of seclusion.

It has been well said that true reforms are the undoing of what has been done. If we return to the simplicity of nature, and then, in the light of all past experience and present knowledge, examine without prejudice what means are necessary to a good education, most of us will be surprised to see how little will be left of the prevalent systems and

regulations and special methods. Discarding these, we shall also be rid of much that is artificial and factitious in resultant character, and instead will be produced a simpler, grander, and more natural style of man, less admired by pedants and people of fashion, but better able to do the work of life and enjoy it.

ROUSSEAUISM IN SOCIAL ANARCHY.

OF the various forms of warfare against the existing order of society, Jean Jacques Rousseau stands as the type, if not actually the literary head. One among the strange and errant men of mental might distorted by the condition of France before the Revolution, his influence has reached deeper and spread wider than any of his compeers, and this not from superiority of genius, but aptness of temperament—his misanthropy (hatred of man associatively) was his inspiration, and is always akin to the discontent which arms failure against prosperity, assailing the social basis as the cause of the discriminated conditions.

John Morley in his late address before the Royal institution upon the influence of Rousseau on European thought, presents the warp and woof of the contradictory texture of Rousseauism. It is an attempt to present Rousseau in his constructive plans, but as pulling down was more congenial to Rousseau than building up, he destroyed his own structures before they were half complete, leaving his purpose half concealed in the confusion of the common ruin. He struggled between the dream of individual freedom and the dream of a social machinery crushing out all inequalities, but his general drift, like most of his class, is to make man the individual the utter slave of the sovereignty of the people.

Morley, a social revolutionist of a milder order, views the retrogressiveness of Rousseau from the standpoint of his own ideal of progress. Half agreeing with the Rousseau conception of society as a mere caprice, but opposed in aim, we have a treatment of the subject distinctively individualized. We reproduce the opinion of the man who believes our civilization is largely a nullity, resulting from misdirection, about the other man, who believed it to be an incubus, or rather a cumbrous garment, which people had to cast off and go naked, before they found the condition of real happiness, viz:—

Rousseau's writings enlarged the attack which the philosophers had limited to theology and the church, so as to comprehend in its criticism the whole social order. As soon as ever the point of view was shifted, as Rousseau shifted it, from knowledge to character, from the acquisition

of truth to the possession of moral harmony, then it was no longer a question of a special set of dogmas or a special kind of spiritual authority, but of the whole range of those external circumstances and relations by which character and the inner harmony are affected and regulated. To one whose ideal of conduct is not triumphant disputation, but a simple life in accord with surrounding circumstances, clearly the main object is not the truth of propositions, but the fitness of institutions. It is easy to see what a vast and deep-reaching revolution this extension of the field of battle made both in the thought of the eighteenth century and in all social thought since. In comparison with the issue raised by Rousseau, which was nothing less than the entire and absolute transformation of the whole social system from foundation to coping stone, the quarrel between the doctors of the church and the doctors of the encyclopædia seemed little more than the proverbial jealousy of a profession on an enormous scale. The differences between Sadducee and Pharisee sink into insignificance before the messenger of a new dispensation.

One way of describing the influence which Rousseau has impressed upon Europe, would be to draw up lists of the ideas which he expounded in his various capacities of novelist, moralist, publicist; such as, in politics, the indivisible, inalienable, irresistible sovereignty of peoples; the propriety of having a State religion; the folly of representative government, which only gives men a moment of freedom at the time of election: in education, the necessity of parents being the teachers of their own children; the mischief of anything like premature competition, and forced rivalry; the superiority of the conditions of rustic isolation and rustic simplicity. But bare catalogues of these several orders of ideas do not sufficiently reveal the total force, by which Rousseau seized the imagination of France, surpassing the philosophers in disrespect for tradition and authority, and the church in devout religiosity; introducing decisively strange and hitherto unknown sentiments—the sentiment of nature for one, of world-weariness for another—into a front place in European literature; and finally achieving the sovereign distinction of true power by making as deep a mark in the thought of adversaries as in the thought of avowed disciples. The royalist Chateaubriand and the christian Lamennais are as much inspired by him as the jacobin Robespierre and the transcendental deist George Sand. A man's influence only completes the circle in this way, when his conception has touched the whole circle of life, and this was the important characteristic of Rousseau,—far more important than what he thought specially about government or theology or education or morals, each independently and apart,—that he fused all these several sets of ideas

into a whole, and subordinated them in their relations to a new type of character and a new type of life. What were the elements of this type? and what was its secret? Its secret was the old appeal, which comes again and again, and always with stupendous effect, in moments when belief is exhausted, and purpose has become pitiful, and social circumstance has pinched and straitened the opportunity for social energy—the old appeal away from outer society to the inner spirit of the individual. “The true philosophy,” he said, “is to return within oneself—*rentrer en soi-même*—and to listen to the voice of conscience amid the stillness of the passions. This was the key-note, the key-note of reaction against a society which was rapidly falling into decrepitude in most of the functions for which a society exists. In decrepit times, if there is ever any revival of vigor, it always takes this form of a return to something to be sought internally in spirit and in truth. Rousseau invited men to turn from dogma in which certainty was unattainable, to simple contemplation of the divinity of which the witness of their own conscience gave them full assurance; to quit the pompous sterilities of art, and literature, and science, and evolve from their own spiritual consciousness a simple and orderly system of life; to abandon the frivolous existence of an artificial society, its meanness, its luxury, its cupidities, and covetousness, and wrap themselves in the sentiment of nature, in a feeling for mountain and wood, for birds and flowers, for all the glorious ordering of the outer universe. How familiar all this is to us; but try to measure its effect, when such a conception first dawned in the midst of the intellectual glitter, the social shallowness of France a hundred years ago. Its very familiarity to us is the measure of this effect.

The stimulus which Rousseau's ideas gave to imagination, sometimes genuine, noble, sometimes infected with a hot and sickly sensuality, and sometimes most unwholesomely substituting bombastic sentimentalism for the robust, direct, concrete, and spacious forms of older poetry, may be seen in the magnificent expansion which has taken place in imaginative literature since his time; and this in the direction of nature-worship, the glorification of solitude, the complaint against social bonds, the professed consciousness of inward capacities far transcending the niggardliness of opportunity, and all the other notes of Rousseau's teaching. If Rousseau had stopped at the presentation of his ideal of the individual life, and of the modes by which you are to prepare us to lead it, his work would have taken its place along with the other Utopian visions by which men are cheered and elevated. But he did not stop here. He advanced from the consideration of the type of manhood to the consideration of the social *milieu*, and the way in which he considered this was the root of the vast mischief which he has done. His method was simple.

He annihilated the milieu; he insisted not only on isolating his phenomena in thought, but in fact also. The whole past of the race was to drop off from us, any clinging roots and threads to be carefully cut away, the so-called progress of the race to be retraced at a single bound, and man to be landed once more in the primeval paradise where there should no longer be any accursed tree of knowledge to tempt him to a second fall. All was to begin over again, history to be obliterated from memory, and the old social order from sight. Does this seem too extravagant? Why, this very spirit descended as by a kind of jerky apostolic succession, and with natural discrepancies, to Fourier, Proudhon, Owen, Leroux, Saint-Simon, and others, and has been seen in some American attempts within the memory of us all.

Let us remark some of the more momentous consequences which ensued logically or otherwise from this unprecedented association of a moral ideal with the active negation of all existing society. Usually the projectors of new ways of living are content to leave the old ways to themselves, rendering unto Cæsar the things that are Cæsar's, and pursuing their ideas in such tranquility as Cæsar may indulge them with. But the whole system was touched directly and aggressively by Rousseau. He maintained that you must study society by men, and men by society; those, he said, who insist on treating politics and morals apart, will never understand either one or the other. This was sound teaching enough, if you mean to treat them scientifically; in that case the two go together. But then his was not scientific treatment, but the *a priori* metaphysical erection of a fantastic moral idea of his own, and the whole work consecrated in the name of Nature, which is the modern euphemism for the great eyeless Moloch of force without a purpose. The moral ideal is full of admirable traits, and Emile, with all its faults, is one of the rare books that possess true psychagogic quality. It is possibly a question whether Rousseau meant it to be more than a Utopian romance. There is a story of some fervent disciple meeting Rousseau, and hastening to inform him that he was bringing up a son in strict conformity to the very letter of the precepts of Emile; to which the author replied, "Then so much the worse, sir, both for you and your son." However this may be, and whatever Rousseau may have meant, the fact that the author of Emile was also the author of the *Contrat Social*, produced a confusion between moral aspiration and the supposed ease of instant realization throughout society, which arising when it did, and falling on the soil which happened to be ready for it, has brought forth a great multitude of social dreams which would be purely grotesque and simply ridiculous, if men did not happen to be ready to die for them. Effect your moral transformation: the social transformation follows along with

it by the same process. Rousseau neglected this, and it is a significant coincidence that the *Contrat Social*, or political gospel, even preceded by a little *Emile*, is the moral gospel. Both gospels, however, were equally forms of the doctrine that nature has given us all, if we choose to listen to her voice, an absolute ideal of the social union, and of the few slight and simple conditions which qualify a man for the discharge of all his duties. His practical disciples in the convention acted in conformity with this kind of view. "It is necessary completely to refashion a people whom one wishes to make free," began one famous report—"to destroy its prejudices, alter its habits, limit its necessities, eradicate its vices, and purify its desires. Strong forces, therefore, must be set in motion," and so forth. Here we see beyond mistake the finger of Rousseau, the confused association of swift and facile change in institution, with swift and facile change in the habit and aspiration of man. The same fatal confusion of spiritual and temporal is to be seen in the ideas of Saint-Just, the most thoroughgoing fanatic of the jacobin party. Observation and experience made him reverse Rousseau's benevolent premise of the goodness of the human heart. Rousseau contended that man is good, and that if you only move the obstructions of society, all would go well. Saint-Just held that man is not good, and that it is for the State to see that he is made so. "The desire of riches," he said, "is universal, yet wealth is a crime." He conceived it to be the business of the legislators to stamp out desires which he admitted to be universal. The land was to be compulsorily divided; every one not a functionary and not an official, was to cultivate the land himself; there were to be no servants, and no vessels of gold or silver; no child under sixteen was to eat meat, and no grown persons in three days of the decade. This was what nature appeared to Saint-Just. This, like all extravagances of socialistic Lycurgeoan thought since, had its root in the pernicious and headlong anticipations of moral reform by root and branch abolition of the existing social laws. But let us return to Rousseau's own doctrine, as it was originally promulgated.

To begin with, his doctrine contained the revolutionary dogma of the equality of man. There issued from it the poetized version of the old theory of the law of nature. If you strip away the surroundings of society, and pierce to what metaphysical dreamers like Rousseau view as the pure and abstract quality of manhood, there can be no reason why one should not partake as much of this abstract quality as another. In *Emile*, for instance, Rousseau's capital production, it is impossible not to feel, in spite of all protests to the contrary, that we are preparing a life of self-contained individualism without relation either to transmitted quality and heritable predispositions or to the active discharge

of social functions. To such an ideal it is indeed indispensable that we may assume in all the material with which the educator has to deal, equality of inborn capacity, benevolent sentiment, and strong generous inclination. That equality being assumed, and all the differences which we see around us being attributed to the depraving action of social arrangements, there is certainly nothing surprising in the vehement energy with which Rousseau's disciples, alike in speculation and action, have dealt with social arrangements.

It is inevitable that such a dogma as this of equality, in whatever sense it may be originally propounded, should be transformed into a proposition of politics, whenever outer circumstances should make such a transformation possible, with or without the chance of translating it from theory into practice. Rousseau declared that a king should not hesitate to give his son in marriage to the daughter of the executioner, if he found in the pair a proper conformity of tastes, humor, character. From this to the doctrine that a king is a mere functionary like another, is not far, and the influence of Rousseau, with his sovereignty of peoples, and equality of man, and law of nature, was decisively attested before his death in the opening words of the American Declaration of Independence.

Democracy was never more effectively formulated than in the passage in *Emile* which declares that "It is the common people who compose the human race; what is not people is so trifling that it is hardly worth the trouble of counting. Man is the same in all ranks; and that being so, the ranks which contain the greatest numbers deserve most respect. In the eyes of the thinker, all civil distinctions vanish; he sees the same passions and the same sentiments in the rough and the man of quality; he only finds a difference in their way of talking, a more or less elaborate coloring; and if any essential distinction marks them, it is to the disadvantage of the more dissimulative. * * Respect, then, your kind; remember that it is composed essentially of the collection of the common peoples; that were all the kings and all the philosophers to be taken away, it would hardly be perceived, and things would go none the worse." (*Emile*, liv. 4.) It was the students of *Emile* who put Louis XVI to death, and sent Lavoisier to the scaffold with the apophthegm that the republic has no need of chemists.

A second consequence of Rousseau's notion of the right life according to nature, was the further development of the doctrine of equality beyond both its moral and its political aspects, into equality of material condition. If merit, under fair circumstances, without original advantage or disadvantage, is the same in every case, how much more than unrighteous it must be that they who sow the seed, and tend and watch and bear

all the heat and burden of the day, should have even less of the fruits than the loiterer who has done no more than look on. Rousseau went further than this, and unsealed a fountain which has since then expanded into a torrent, by this memorable declaration: "The first person who having inclosed a piece of ground, bethought himself to say, 'This is mine,' and found people simple enough to believe him, was the true founder of civil society. How many crimes, how many wars, how many murders, what miseries and what horrors, would not have been spared the human race by one who should have plucked the stakes out of the ground or filled up the trench, exclaiming to his fellows, 'Beware of listening to this impostor; you are lost, if you forget that the fruits are for all, and that the earth belongs to no one.'" The significance of the fact that no one did thus rise up and interfere with the trespasser on this interesting and momentous occasion, is as entirely ignored as the significance of the fact of the founder of the institution of property being drawn, in spite of the goodness of his nature, which no society could as yet have warped or disturbed, into so disastrous a transgression. With Rousseau you are always equally distant from positive evidence of what actually happened, and from a rational explanation of what he alleges to have happened. Yet the air of rigorous deduction and close reasoning which he maintains even when in the height of his passion, has misled not a few into taking for genuinely scientific forms the solemn dialectic with which he works out his most preposterous sophisms.—People made heedless of logic, either by misery or by intense compassion for the misery of others, never stopped to inquire as to the exact accuracy of a man's syllogisms who was so fervent in his assurance that the poverty which cries aloud on the earth is due to a simple and easily removable accident, and that misery is not only unnecessary, but is preventible by such simple processes as declaring men equal and abolishing property.

It is sometimes complained that the impulse which Rousseau gave to democracy has only led men to think in an envious and ignoble way of material comfort and gratification of sense as the aim and end of the life of the people. This complaint, we may observe, is usually found on the lips of persons whose own senses are sedulously lapped in material comfort, but wherever found, it is unjust. Rousseau did not envy the luxurious liver, he despised him; he did not wish all to become rich, he wished all to become poor; the plain effect of his teaching was not to make the modest poor envious, but to make the rich and luxurious ashamed. We lose the key to all his thoughts if we cease to remember that his notion of democracy was not materialist, but spiritualist, and had its fountain in a strictly moral revolt.

Rousseau himself is not absolutely consistent in his aversion for society, and there is at least one place where he speaks with reference to Poland distinctly like a disciple of the historic method—a man of true genius cannot help having glimpses of common sense—but the general tendency of his teaching, and that which was seized most eagerly by all his followers, was to hold up the social order as the evil bulwark restraining and penning up this vast and generous flood of human nature. They never explained, and never seemed to have felt the need for having it explained, how this monstrous bulwark had been raised. Voltaire's attack on religion manifested the same shallowness: mankind, he said, were very intelligent, and their intelligence would have made them very happy, only by evil chance they were all overtaken by religion; where all the religions in the world came from, and how it was that men all over the face of the globe opened their hearts to them, and how it was that their intelligence did not prove a shield against such an enemy, he never thought it necessary to inquire. What religion was to Voltaire, society was to Rousseau. Men would all be leading sweet and lovely lives, with souls open to the highest, and senses fresh for all the simple delights of nature, if only they had not been perverted by society; but whence this frightful monster, gorgon, and chimæra dire had its origin, who invented society, why men with all the vigor of young and unsophisticated humanity strong within them came to accept the detestable invention—these were questions which the school of Rousseau never thought of asking. The fundamental problem of origins once put, they would have been launched in that scientific path from which they revolted. They would have had to perceive that the conditions of the social union, with all its miseries and all its inadequateness, are as much the outcome of human nature as the most heroic type of character or the most perfect ideal of life. Rousseau maintained that bad institutions are in reality not institutions in any right sense; and by the same process of reasoning he counted the bad qualities of men and women as no qualities at all. Society was the unfortunate scape-goat on whose head the sins of the whole congregation were solemnly laid, leaving humanity free of spot and stain.

It will be perceived that we are immersed in the abstract or metaphysical method, that our social teacher is just as competent to talk about society as the men who believed in occult virtues were to talk about chemistry, or those who believed in vital spirits to constitute biology. He was persuaded of the real existence of entities corresponding to his own abstract conceptions. As if society were something apart from the men and women who compose it; as if human nature were something apart from any actual qualities which men and women have

ever shown; as if the laws of nature or the rights of man existed or had once existed in some known document. There is a story that at the time when the convention were deliberating upon a new constitution in 1793, one of its members went to the national library and inquired for a copy of the laws of Minos. The librarian had to explain that Minos was the son of Zeus and Europa, an Homeric person, a mere shadow of a name in a myth, and that though no doubt his laws would have been of great service for France if only they had survived, as a matter of fact no copy had been preserved. Men thought in the same real and corporeal way about the laws of nature, and all the other metaphysical figments with which Rousseau had deluged their minds. They supposed that there had once been really seen on the earth that noble, pure, elevated life which Rousseau called the state of nature, and which was in truth nothing but a private invention, evolved from his own consciousness, leading to the most fatal retrogression in the path of civilization, but yet eagerly welcomed by a decaying and unhappy nation.

For the material exhaustion and administrative debility of France were what gave such fatal illustration to the dialectic of the Social Contract. If the people had been materially prosperous, and the government of the time a strong and coherent organ of national life, the Contrat Social and Emile would of course no more have led to the destruction of the old framework and the triumph of jacobin principles, than the publication of a new translation of Plato's Republic would have done so. The concurrence of certain economic and political conditions was required here, as always, to turn mere speculation into a violent explosive. Of all the known misfortunes of western society—there may be many more of a primitive kind of which we are blissfully ignorant—we can hardly point to one more disastrous than the external circumstances which happened to give to the speculations of Rousseau a short moment of absolute power, before there had been time or opportunity of sifting the sound grain of truth in them from their evil and drastic husk.

That there was a sound grain in them, we perceive by considering the opposite way of seeking social truth. This opposite conception, which arose in modern thought with Montesquieu, Turgot, Condorcet, Adam Smith, more or less at the same time as Rousseau's, regards society as an organism, the subject of growth and development, the direct resultant of the forces of human nature and the forces of our outer circumstance and surrounding, the final issue at any given time of an accumulation of preceding states, and therefore spontaneously regulated at any given moment by a number of conditions which are capable of scientific examination and statement.

This historic or positive conception of every social state has a constant tendency to narrow the limits of social endeavor by freezing men's hopes of what is possible; to exaggerate the tightness of the grip which the past has on the present and future; to reduce social truth to a mere business of historical exposition, and to confound the explanation of an institution or a use with its permanent justification and eternal warrant. The irrefragable principle not only of the value of social continuity, but of the proved impossibility of suddenly breaking that continuity in any of its deeper elements, is in perpetual danger—first through the natural disposition of men towards the extreme application of any principle, secondly from the comfort which the extreme application of this particular principle brings to the indolent and selfish parts of us all—of being pushed ever on and on, until at last we find ourselves confronting all the cruelty, waste, brutishness, that make such havoc within us and without us, with nothing better than the dulled vision and the impotent right hand of a philosophic fatalism. The element of good in Rousseau's passionate declamation was the impulse which it gave in the direction opposite to this. He went as far from the truth on the other side, believing that we have only to frame our conception of human nature in the abstract, and then to deduce from that conception all the maxims which are necessary for the construction of a perfect social system. The extreme view of the easy modifiableness of society is just as untrue and just as perilous as the extreme view of the difficulty of modifying it. Safety lies nowhere but in the mean between the stationary fatalism of one school, and the retrogressive dream of the other; and this mean we can only secure by fixing our eyes on the past experience of the race: by contrasting the condition of the most backward tribes, I will not say savages, but of those who have taken some of the decisive steps that lead away from savagery, with the most advanced western communities, many and deep as are the stains still defacing our civilization, and marking even in the empirical and tentative manner which is all that the present development of social study permits us, the long road and the many halting-places and the critical turning-points by which the vast hosts of humanity have sadly or jubilantly made their way from the old lands of night. This was the experience from which Rousseau turned away his face, and it was because he turned away his face from it, and had no thought, nor reverence, nor gratitude, either for the great intellectual leaders who had, one after another, and little by little, laboriously worked out a progressive modification of knowledge and laws to meet more satisfactorily the eternal exigencies of human nature, nor for the great moral leaders who had gradually elevated our conception of the height to which human nature is capable of rising, as well as by

noble and holy example kindled in men the burning desire and strong thirst to rise to this height—it was because he thus thrust behind him the intellectual and moral endeavor of the past that his own ideal was smitten with scientific and moral barrenness, and after a space fell to the ground like a tower without foundation or a tree with no earth about its roots. His true influence lies apart from his ideal, in the impulse which he gave to the motives for search after social truth. He set forth as no one had ever done before the nullity of a civilization whose consummating benefits only the few partake of, and he brought into a prominence of which it can never be again deprived the truth that the very aim of all our art and science and organization is missed, so long as the great majority of men are as Gentiles, standing without the gates and having no inheritance in these things. After all, as I have said elsewhere, it was much to induce thinkers to ask themselves, and the bondmen of society to ask their masters, whether the last word of social philosophy had been uttered, and the last experiment in the relation of men to one another decisively tried and irrevocably accepted.

THE ART OF MEMORY.

THE use of artificial aids to the memory is wide-spread—almost universal. We experience so much, and remember so little, that customs inevitably spring up of associating events which it is desired to remember with others which are calculated to make a deep impression on the mind. “Benvenuto Cellini tells us,” says Lowell in one of his essays, “that when, in his boyhood, he saw a salamander come out of the fire, his grandfather forthwith gave him a sound beating, that he might the better remember so unique a prodigy”; and “in France it was customary to whip the children annually at the boundaries of the parish, lest the true place of them might ever be lost through neglect of so inexpensive a mordant for the memory.” The same assistance to the youthful mind was formerly given in some parts of Great Britain, on the occasion of a transfer of property. Readers of Dickens will also recall in this connection the singular conduct of Hortense, the French maid, in *Bleak House*, in taking off her shoes and walking home without them through a wet field, that she might imprint on her mind a slight which she wished to revenge.

A still more common practice is the endeavor to force an association of things to be remembered with others which are permanently present.

Probably millions of people occasionally tie a string about one of their fingers to remind them of something to be done. The French carry a ribbon in the buttonhole for the same purpose, and the ancient Romans were accustomed to turn the stone of their rings towards the palm of the hand. In Persia a knot is tied in the scarf, and in China a thread is fastened to the moustache, or a little bell hung from the brim of the hat. Among savage nations, permanent signs like these are sometimes carried to a considerable extent. An African traveller mentions a negro who had pierced his nose by a long porcupine quill that stood out on each side of it like a yard-arm, and had attached to this quill in different places twigs of various trees, each connected with a small fragment of some article of food. By questions and threats it was found that the function of this arrangement was to remind him where he kept his store of provision. For example, to a piece of baobab wood was tied a small bit of cocoanut. Taking the traveller through the woods, he presently came to a large marked baobab tree, climbing which, he disclosed a hole in one of its enormous branches where he had hidden a quantity of cocoanuts.

Leaving such rude customs, however, we find that pretentious systems and schools of mnemonics have existed from a remote antiquity. Herodotus says that "the Egyptians possessed the most celebrated mnemonic schools in the world," and the hieroglyphics on their monuments have been called "a species of mnemonic pictures, unfolding to the eyes of the people a series of the most interesting facts in their national and religious history." Among the Greeks and Romans there was taught a system called "local or topical memory," which seems to have been chiefly intended for orators. Cicero acknowledges his obligations to it. Its invention was ascribed to Simonides, a lyric poet of Ceos, whose death is dated 467 B.C. He conceived the idea of his system on observing how he was assisted in remembering who were present at a certain entertainment, by forming to himself a mental picture of the table with the guests seated around it. Quintillian speaks of the system as used by many in his day, and says that they imagined a large house divided into many apartments, every recess and noticeable feature of which they fixed so perfectly in the mind that they could recall it without any hesitation. This done, if they wanted to remember the order of the parts of a long discourse, they assigned to each of the parts some sign: for example, if the first part related to maritime affairs, an anchor for it; if the next related to warfare, a sword for it. They conceived these signs as stationed in different parts of the house—the anchor on the porch, the sword in the hall, and so on through the galleries, parlors, bed-chambers, &c., *always observing a certain order*. A series of mental pic-

tures was thus imprinted on the mind. It is then obvious that while delivering the oration they could imagine themselves going from one part of the house to another in the preappointed order, and observing the signs there, which would suggest to them the heads of their discourse. This practice did not last long after the time of Cicero, and scarcely anything more is heard of mnemonics till the latter part of the sixteenth century, when Lambert Schenkel, a distinguished German scholar, modified the plan of Simonides, and taught it throughout Europe with considerable success.

It was not till 1730, however, that the method was invented which has been followed by all mnemotechnists since, namely, the representation of numbers by letters combined into syllables and words. The Hebrew, Greek, and Latin letters have well-established numerical values, and the Jews sometimes inserted in the titles of their books words which indicated the date of issue, if the numbers corresponding to their letters were added together. A study of this fact suggested to Dr. Richard Grey a system of mnemonics which he published in 1730 under the title of *Memoria Technica*. He assigned to each digit a consonant, and also a vowel or diphthong, as shown below:—

1	2	3	4	5	6	7	8	9	0
b	d	t	f	l	s	p	k	n	z
a	e	i	o	u	au	oi	ei	ou	y

(The letter *g* multiplies the previous letter by 100.)

The numerical power of each of the above letters is first thoroughly fixed in the mind. Then suppose it is desired to remember that King John of England began his reign A.D., 1199. The thousand may of course be understood. The 199 is *anou*, or *boun*, or *ann*, other combinations being impracticable. "I make choice of the last," says Dr. Grey, "for then it is but calling him *Jann* instead of John, and you have the time almost in his name." The plan of the system is thus shown at once. To as much of the name as will insure a knowledge of what name is meant, add a nonsense syllable indicating the date. In this way Dr. Grey formed strings of barbarous words, and arranged them in lines resembling Latin verses. Here are the verses to be learned for remembering the kings of England from 1066 to 1730, with the dates of their coming to the throne:—

Wil-conseau Ruffot Henrag.

Stephbil & Hensechuf Richein Jann Hethdas and Edldoid.

Edsettyp Edtertes Risetotp Hefetoun Hefjadque.

Hensifed Edquarfaws Ed-Rokt Hensepfell Henoclyn.

Edsexlos Marylut Elsluk Jameyd Caroprimsel.

Carsecsook Jamestf Wilsetik Anpyb Geobo-dot.

It is obvious that the same course may be pursued with all chronology. Dr. Grey's system, it is said, was adopted before his death in almost all the schools of Great Britain. If so, schoolboys have cause to rejoice that it has long fallen into disuse.

The most remarkable system of mnemonics ever published is that of M. Feinagle, who commenced to lecture in 1807, and created a great sensation throughout Europe. He modified Dr. Grey's system by giving numerical power only to consonants, and using vowels at pleasure to form real words with such consonants. His key is as follows:—

1	2	3	4	5	6	7	8	9	0
t	n	m	r	l	d	c	b	p	s
						k	h	f	x
						q	v		z
						g	w		

Fanciful reasons were given for this assignment of letters to numbers: *t* is 1 because it has one down stroke; so *n* has two, and *m* three; *r* is the last letter of the word *four*; *l* may be 5 because the Romans used it for 50; *d* is like a reversed 6; *c* and *g* occur in the word *cage*, which may be imagined as suspended on a crooked stick, the figure 7 is like a crooked stick, so it may be represented by *c* and *g*, also by *k* and *q*, since they are similarly sounded; *b*, *h*, and *v* occur in the word *beehive*, and an 8 is something like two beehives; *p* and *f* form *puff*, and a 9 is like a pipe; *s* and *z* hiss, and a 0 looks like a mill-wheel, which hisses as it goes round. We shall see afterwards how these numerical letters, or rather literal numbers, are used, but must first glance at the system of localities which M. Feinagle altered from that of Simonides.

His fundamental conception is a room whose floor and side-walls are each divided into nine parts numbered as in the following diagram:—

1	2	3
4	5	6
7	8	9

The floor comes first, devoted to the numbers from 1 to 9. The wall to our left comes next; the number 10 is imagined next to it on the ceiling, and its nine digits stand for 11, 12, &c., to 19. The wall in front of us has 20 next to it on the ceiling, and its divisions stand for 21, 22, &c., to 29. In the same way the wall to our right, and that behind us, bring us up to 39 and 49. In the middle of the ceiling is a little square for 50. By dividing a second room in the same way, places are allotted to the numbers from 51 to 100.

The first thing for the learner to do is to fix in his mind the exact position of each number. The next is to imagine on each of these divisions a picture, which is to be permanent, and to have, if possible, some resemblance to the figures of the division on which it is placed. Thus, on the first square the tower of Babel is imagined, as an unfinished tower may be conceived as having some likeness to the figure 1; on the second square a swan, looking something like a 2; on the twentieth square a peacock with its tail spread, faintly resembling a 20; on the seventy-seventh square two mowers returning from work, whose scythes over their shoulders make a tolerable 77. Some of the resemblances are, however, much more far-fetched than these, and require a willing imagination to admit them. With the hundred pictures the learner is to become intimately familiar, so as never to forget them through the rest of his life. Having done this, whenever he wants to remember any series of things, he must connect its first member with the tower of Babel on the first square, its second member with the swan on the second square, and so on.

But this connection is often a difficult thing to make in any striking way. Suppose, for instance, we wish to remember the kings of England since the conquest. The names William, Henry, Richard, &c., do not very readily link themselves with towers, swans, and peacocks. Feinagle got over this difficulty by substituting for proper names other words like them in sound, and then imagining pictures corresponding to the new words. Thus, for William I, write *one willow*; for Henry V, write *five hens*; for Richard I, write *the first rich man*. The memorizing then proceeds thus:—

For William I, imagine *one willow* fixed on the tower of Babel; as he was the *conqueror*, hang some *laurel*, the crown of conquerors, upon the willow tree; as to the date of his accession, 1066, say the laurel is *dead* (*dd*=66, vowels do not count, and 1,000 is understood).

Next, as to William II (Rufus); there must be *two willows*, one on each side of the *swan* (second square); and the date is indicated by conceiving the swan to be in a *bag* (*bg*=87); the bag may be *red* to preserve the meaning of Rufus.

The twentieth king is Henry VIII; conceive the *peacock* (twentieth remel. to have *eight hens* in her nest; they are young and cannot speak their comin^g, *sp*=509).

ry is that if anyone who had mastered the system should Step¹ at he had learned about Henry VIII, he would naturally Edsety^g; he would mentally see them in the nest of the pea- Hensif^g Edsexlos^h he would infer that Henry VIII was the twentieth Carsecok Ja: conquest, and he would seem to hear them *lisp*,

telling him that Henry VIII came to the throne in 1509. It is worthy of note that any number of details may be inserted at any time into this amusing picture, to indicate the principal events of the reign. Thus, to represent the separation of the English church from that of Rome, we may imagine a figure of the pope introduced into the picture, and let it be at him that the eight hens lisp; as to the date, conceive the pope to be *lamed* (*lnd*=586). In general, Feinagle's associations are childish, and almost as obscure as whatever was present to the mind of the person who made the remark, "Well may this place be called Stoney Stratford, for I was never so bitten by fleas before in my life." And as to the putting hen for Henry, willow for William, and the like, we are reminded of an estimable lady of our acquaintance, who, having a poor memory, was wont to strengthen it by analogies, and on being introduced once to a Mr. Fish, said to herself, "Fish! I'll think of shad"; which she did, and called him Mr. Shad the next time she met him. Wherein lies a lesson—against filling the mind with folly in order to tangle up a little wisdom in it: the folly may abide, and the wisdom exhale.

When the present writer was a very small boy, he used to be carried down to breakfast in the morning on his father's shoulders; and he well remembers that at one time a merry custom sprang up of making a boisterous entry into the breakfast-room, both father and son shouting amid peals of laughter, "*Satan may relish coffee pie.*" This, he has since found, is the key to a modification of Feinagle's system, taught to immense classes in the principal cities of the United States about twenty-eight years ago by one F. F. Gouraud. The digits, beginning with the *cipher*, were represented by the *sounds* (not the written characters) of *s, t, n, m, r, l, sh, c, f, and p*, in the above sentence. He goes almost entirely by sound, *ph* representing 8 as well as *f, c* soft, like *s*, standing for 0, and *c* hard, *k*, or *q*, standing for 7. There is a little analogy introduced in making *j* and *ch* stand for 6, as *sh* does, and a few other cases. *H* does not stand for any number, neither do *w* and *y*, in the cases in which they are usually called consonants. The following is the complete basis of the system:—

0	1	2	3	4	5	6	7	8	9
s	t	n	m	r	l	sh	k	f	p
z	d					j	q	v	
c (soft)						ch (soft)	c (hard)	ph	b
							g (hard)		
						g (soft)	ch (hard)		

Gouraud rejected all Feinagle's squares, and did everything by nonsense sentences. To remember that the destruction of Troy took place in the year 1184, B.C., he gives you this sentence to learn:—

"The destruction of Troy was completed by the raging flames of a hot wood fire"—(*tdfr* = 1184).

Other examples are:—

"Jonah, after being swallowed by the whale, had upon him the effect of a powerful phyc"—(*phsc* = 807.)

"The combat between the Horatii and Curatii was not like a tournament, a mere showy joke"—(*shjk* = 667.)

"Hannibal, unceasingly persecuted by the Romans, was obliged to quit this world, which had become to him a stiff image of Hell"—(*s* is 0, *tfrmgl* = 18365.)

We may see from the above that *ff* or *ll* counts the same as *f* or *l*, having the same sound. Articles, prepositions, and conjunctions, like the vowels, go for nothing. By the last sentence quoted above, we are to be reminded that Hannibal died B.C., 183, at the age of 65. Gouraud has a huge book full of these sentences, and though at first they unquestionably imprint themselves on the mind by their oddity, it seems probable that an attempt to crowd them upon it in large masses would result in something resembling idiocy. Particular is this the case with his astronomical department, in which he gives, among other things, what might be called a nonsense biography for each planet, indicating an immense number of things which astronomers have tabulated about it, and some which they have not: for example, its mean distance from the sun, the diameter of its orbit, the eccentricity of the same, the inclination of its axis, its mean velocity, its time of revolution, its surface, volume, density, &c., &c., &c., closing with its possible population at 277 to the square mile.

Artificial mnemonics are not altogether destitute of use: few things are. We must all know many people who have heard and repeated the number of days in any given month hundreds of times, yet who cannot recall it with certainty without mumbling over to themselves the doggerel:—

"Thirty days hath September,
April, June, and November," &c.

The only personal experience which the present writer has of nonsense mnemonics is of the well-known lines found in treatises on logic, commencing, "Barbara Celarent," &c. He learned these in a few minutes eighteen years ago, and has never forgotten them since. They fixed in his mind an amount of information that he believes he could not have acquired in the natural way by ten times the study, and then most of it would have speedily faded from the memory. If a mathematician were desirous of remembering the base of Napier's logarithms

(2.7182818), and the modulus of Briggs's (.4842945), he could do it on Grey's system by making the words *basepakekak* and *modfisenfu*, things much more easily remembered than figures. Grey's system, barbarous as its words are, has a great advantage over Feinagle's or Gouraud's in its brevity. In the latter, some such sentence would have to be made up as "Napier made a *naked funny wavy dive* after Briggs's *raw marine pearl*." These sentences are difficult to make up, and the only way in which Feinagle's or Gouraud's system could be of much use would be to have that done once for all with respect to a great number of things which it is desirable to remember. This is what Gouraud has attempted, and a brief examination of the result is sufficient to show why these systems are so soon laid aside by those who entered upon them with most enthusiasm.

This is their decisive defect—that there is really little use in remembering the things to which they are best adapted. Dr. Grey, in the preface to his *Memoria Technica*, says that it is not designed to make the *memory better*, but *things more easy to be remembered*. Now what people really want is to make their memories better. They rush eagerly to mnemonic systems, expecting them to do that. Some of Gouraud's classes in this country contained over 2,000 pupils, insomuch that he could not get halls large enough for his purposes. Men went there expecting to improve that defective memory that had troubled them so much in business, in literature, in social life. They soon caught up the fundamental basis, and speedily learned a few sentences, which they saw actually did fix in their minds certain important dates. They were encouraged and went on. They came to the learning of hundreds of pages of nonsense, to gain such knowledge as when Antigonus died or when the Romans annexed Pergamus. Then they began to get discouraged: they began to feel that the end and aim of the thing was not what they needed. The truth is that the whole monstrous superstructure is built on an erroneous conception of the real worth of history. History read with interest and judgment elevates our minds, forms in us true conceptions of human character, awakens our sympathies for great actions, and guides our present course by all the experience of past ages. But history as a mere list of names and dates to be painfully stamped on the memory, is a waste of the mental energy which should be directed to more noble culture. "Lay up nothing in the memory," says Dr. Watts, "but what has some just value in it, and is worthy to be numbered as a part of our treasure." Indeed it is a serious question how far we should try to cultivate the memory at all. Perhaps under ordinary circumstances the acquisition of knowledge should proceed undistracted by care for the retention of it. In so far, however, as that retention, and readiness in

reproducing what is retained, may be assisted by particular habits of study and observation, the formation of such habits is of the highest importance. A brief endeavor to indicate the most important of them may form a fitting close to this article.

1. *Attention.*—We may both encourage a general activity of mind, and cultivate a habit of intense application to the matter in hand. Dr. Johnson is said to have become wholly unconscious to everything around him while he was reading; “his countenance was flushed, the veins of his forehead became distended, and his whole appearance betokened the intensest mental concentration.” The result was that he always had his knowledge at command. It is, however, difficult and unpleasant to get up or force such a severe attention, whence the desirability of selecting for our pursuits such things as we naturally incline to and delight in. A child listening with keen interest to a fairy tale will repeat it afterwards almost word for word. If, on the contrary, he is systematically set at tedious and repulsive tasks, his apprehension is dulled and his progress slow. The more striking and vivid one’s impressions, the more full and correct will his reproductions be. We cannot remember anything unless we first have it. Hence the uselessness of uninterested and of too rapid reading. Ideas not fully grasped, ideas hastily skimmed over, never really find place in the mind at all; how, then, can they be recalled? “Nor is it enough,” says Dr. Wayland, “that a man can comprehend what an author has written while the book is under his eye. He should attain to such a knowledge of the subject that he can think it out for himself in his own language, and trace its connections and dependencies by means of illustrations of his own.” Such a manner of acquisition will be slow at first, but may afterwards become as rapid as any other.

2. *Practice.*—In memory, habit is the ultimate fact: indeed, memory may be defined as the action of the mind in ways to which it has been accustomed. Therefore, to strengthen the memory, we should frequently reproduce as much as possible of what we deem valuable in our past experience. Sitting in a railway car, or walking along the streets, or lying awake in bed, we may recall as much as possible of an experiment we have made, an act that we or others have performed, a lecture we have heard, or a book we have read. It is by such practice that mathematicians become able to conceive complicated diagrams and solve difficult problems, and chess-players to play games without seeing the board. They gain the ability to mentally see the board before them, and the pieces in various positions on it. In this way, too, the calculating prodigies, who now and then surprise the world, must have acquired their ability, the precise point of their practice being probably the hold-

ing of results arrived at depicted before the mind's eye as if written on a slate or blackboard. An essential condition of good practice in memory is reliance upon it. A man who continually uses written memoranda will never be able to do anything without them. We should, as Charles Reade says, keep our note-book on our shoulders. A distinguished man is said to have been in the habit of writing memoranda, and then immediately tearing them up, after which he remembered what he had written when it was wanted. The memoranda served the purpose of increasing the attention. We have known a teacher conduct a lesson for an hour, hear recitations from thirty or forty boys, assign each a mark, and then at the close of the hour write down without mistake the mark of each. Many physicians, too, can recollect accurately their appointments by trusting to memory; perhaps all could if they habituated themselves to it from the first. There are original deficiencies, however, which cannot be supplied. Dr. Priestley must be supposed to have taken a deep interest in his own writings, yet he said that in reading over what he had published, it all appeared perfectly new to him.

3. Natural Association.—It is important constantly to seek relations between new facts and those which we have previously known. The whole secret of method lies here. A geometrical demonstration is much easier to remember than a chronological list: one part of it suggests another. Hence facts should be referred to principles which they illustrate—should be classified in the mind according to their bearings. Study Herbert Spencer's works, and consider how he must classify facts. Everything must fall into its appropriate niche in his mind. The general principle here is to connect as far as possible everything that is to be remembered with other things in connection with which we will probably want to remember it. To give a minor example of its working, suppose a man desirous of remembering to stop at a certain shop that he is going to pass. He may mentally picture his walk for a short distance before this shop, conceive himself looking out for it, noticing other prominent objects in the neighborhood—and then turning to the shop, connecting it thus with street-corners, windows, &c., thinking of himself as wanting to go into it, in each connection. This done before setting out, he will be likely, when he really comes into the neighborhood, to be reminded of what he wants by every object he sees.

4. Truth.—We must be true to our memory. When we reproduce what we have seen or otherwise experienced, it must be with scrupulous fidelity. No details must be filled in by the imagination. It is one of the most difficult things in the world to speak the exact truth, or even to represent to ourselves the exact truth. If we hear an event frequently

related, we soon begin to confuse it with our own recollections. In this way, honorable and conscientious persons have testified to witnessing occurrences which really took place before they were born, but which had been often repeated to them in childhood. The imagination is an active and deceitful faculty, often putting on the guise of recollection. Without the most vigilant care to distinguish the two, men may come to utter the most absurd falsehoods without any suspicion that they are not telling the truth. Imagination is but a rearrangement of our experiences, and the faculty of taking note of this rearrangement gets untrustworthy without a persistent and conscientious exercise of it. Hence, though, as the proverb says, liars have need of good memories, they are of all men the least likely to have them. The best cultivation of the memory, therefore, forbids us even to heighten the color of a narrative, or sharpen the edge of a witticism, when professing to narrate what has occurred, but to accept dulness rather than admit inaccuracy.

JOSEPH HUDDART.

AMONG the worthies of Cumberland, England, whose lives are sketched by Dr. Lonsdale, the most noteworthy in essential merit is Joseph Huddart, though the vaunted Howards head the list. Joseph Huddart, born in 1741, was the son of a village shoemaker of Allonby. The boy, like David Roberts, had no liking for shoemaking, and the father let him "gang his ain gait," which tended to seafaring and engineering, and a love for instrumental music, which led to his playing well on the flute and violin. He was early afloat, and at the age of three-and-twenty he was expert in the coasting trade, but at a subsequent period his eyes were directed towards the other side of the Atlantic:—

"As his ship-building ideas were revived, he went to Maryport, five miles farther west, and had a ship built on his own plan, and partly by his own hands, in 1768. This ship of Huddart's has got the credit of being the first constructed in Cumberland from 'draft,' or drawings, and working by scale. As master of his own ship, and about to extend his navigation beyond the coasts of Britain, Joseph now seems entitled to the name of Capt. Huddart. A voyage to America being determined upon by Huddart, his friends suggested that a sailor who had frequently crossed the Atlantic should form one of the crew; the advice was adopted, but, curious to relate, the sailor of many passages' experience was no match for the captain, who only made it for the first time. The captain's observations and reckonings were so accurate, that he was enabled

to point to the land first seen on the American coast as the very port he was bound to; and though his sailor judged very differently, he steered for the river, and found the wished-for haven. Here was a triumph of science over uneducated experience; and it is but one of the thousands of proofs daily occurring to show the accuracy of astronomical data, and the glorious privileges possessed by modern navigators."

Later still, Huddart entered the H.E.I.C.S., and he was the first man who ever made a survey of St. George's channel! The close of a quarter of a century of ship-life and seafaring is highly characteristic:—

"With his last voyage to India, Huddart completed twenty-five years of a sailor's life, and, with the exception of the dangerous expedition off the Cape of Good Hope, already mentioned, experienced no disaster. It might have been otherwise on his return voyage from Bombay, had he not exercised his usual vigilance in noting the meteorological changes. He set sail from Bombay with seven other vessels, and with the wind and weather most promising. Seeing the approach of bad weather, he returned in two or three days to Bombay, to the great dissatisfaction of the governor, who threatened to report his conduct to the board of directors. A violent storm had overtaken the other ships, and nothing was ever seen of them but the wreck of broken timbers strewn along the coast. When the storm had fairly subsided, Capt. Huddart called at the government house to take leave, and accosting the governor, jocularly said, 'Governor, I am ready to sail; I only wait for your letter to the court of directors.'"

Huddart's inventive genius was never at rest. At the age of seventy-five, when the shadow of the inevitable angel was upon him, "he turned his attention to the study of the anatomy of the human body, for the purpose of tracing his disease and aiding the doctors in attendance." He died notwithstanding in 1816; but Dr. Babington said that if Huddart had "originally turned his attention to medicine, he would have reached the top of the profession." Huddart was the friend and colleague of Watt and Rennie.

LABOR THE INSTRUMENT OF INVENTION.

IN a paper in the previous issue of this Review, it is stated that "no laborer in the United States or Europe probably undergoes an equal physical strain to the Chinese barrowman, who seldom reaches the age of 40 years." This is in consequence of no demerit in the poor Chinaman personally, nor lack of skill to adapt himself to higher labor, but is the burden of the inferior social condition of his nation. Yet this inferiority, with all its burdens, is an advance step from lower conditions. Throughout great sections of Asia, Africa, and South America there is

in a great degree no labor for the laborer; there may be occupation instead of idleness, but the result is little removed from inaction. The toil may be the hardest, the workman most earnest and persistent, but the end is nearly total failure. The elements requisite for the use of the bodily and mental ability of the population not being present, such abilities are nearly valueless. To such helpless hands invention comes with new work and new life. Invention, which includes the first forward step in every art or practice, coming to the aid of necessity, makes labor a practicability by making the art in which labor finds its opportunity. Invention makes the laborer as such, makes him one kind of workman in one age, another kind in another age; gives him all the capabilities of his position, gives him the means towards his ultimate rewards, and is continually giving to him and aiding him. Yet nothing is more common than for the workman to suppose that all he does, he does of himself.

Invention as labor-saving is not the displacement, but the transplacement of labor. It takes up the man from the crudest forms of force to put him on a plane of higher utility. Yet we think it favors mediocrity of manual skill rather than exceptional dexterity. Where elaborate machineries are capable of distinct products, which, though distinct, are exact in their adaptation to one another for combination, exactness of handcraft is not called for—for at its best it is surpassed. There can be no marvels of handcraft in competition with machinery. Hence the highest style of workman disappears along with the roughest toiler. Hence the seeming paradoxes of our present industrial position. We are amazed at the new wonders of our mechanisms, we are alarmed, perplexed, and annoyed at the paucity of skill among our operatives. Our youths grow up without the training of the excellent past apprenticeship system, pick up their crafts by chance and at random, take places in the multiplying diversities of industry, and have a work in productions surpassing the powers of their better-trained predecessors. Mainly, this is attained by a greater division of labor. The hand unequal to a whole, is thoroughly adequate to a part. Invention keeps him busy in a very narrow circle, and facilitating his work makes him practically—i.e. in his narrow round—the equal of his superior.

With such development it is clear that the conditions of laboring classes are graduated by the scale of invention. We know that great material resources may be about a people, and yet the people be idle and destitute. We know that capital will not organize labor for production unless there is profit to it, and we know that where a want is to be supplied there must be among the people purchasing power sufficient to

pay the profit, and this purchasing power is secured by labor as the agent of invention.

In the stories of the Crusoes cast on uninhabited islands, inventive man, alone and unaided, confronts nature with his aptness for her appliances. The Man-Fridays are brought into the work and have their part in the new order of things, but they are then lifted out of their normal state, and turned to an account as distinct from the direction of their own powers as a new creation.

The new being has new wants, and the pressure of such wants forces more labor, and this advancing him still farther is the price he pays for his rise. His wants always keep ahead of his personal condition.—What would be luxuries in one stage, are but necessities in a succeeding one. He complains about wanting what he once did not dream of. It is a Divine discontent. It is the human conquering the bestial—the upward working soul. No replies reporting past conditions or suggesting worse possibilities can allay the discontent. Laborers have comforts which kings once had not. But

O, reason not the need,—our basest beggars
Are in the poorest thing superfluous;
Allow not nature more than nature needs,
Man's life is cheap as beast's.

From the cheapness of nature we have gone into the costliness of art, and if the costlier life of art is not full-pursed in all its divisions, it argues no deficiency in invention as a supplier of physical wants. Opportunity for the supply of such wants was made by the Great Adjustment which preceded all man's contrivances. Away in companionship with the elephant or the bear, man was not foodless or shelterless, and apart from social changes and restrictions, invention not only leaves the full scope of that opportunity, but adds to it aids and means. The wants of rational man—the wants which are beyond the mere sustenance of the animal organization—are created by reason, and through reason working by art those wants will have their supply, not in full but in graduated degrees. Man wants but little, he has it; man wants more, and he will have of the more, but never, never the full more. Being poor, the operative in a manufacturing district may be badly fed, clothed, and housed; with inferior food, shelter, and clothing, the Wandering Korak is rich.

Does invention justly pay her toilers? To solve this, contrast her payments with nature's in the returns given to equal force applied. Go back of the machines, back of the simplest tools, to the unaided hand. For beast and man nature shows a common scale of award. The pyramid builders were liberal paymasters in comparison. If invention, marshalling her servants to their duty, sets one over many, for needful discipline, she is as generous to one as to another, according to his place; and in the different placing she simply accepts the distinctions which she finds. To all discord she speaks peace, to all trial hope, being sure that by her ways alone can men find the better condition which they covet.

MINING AND METALLURGY.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Delaware.]

REPORTS of the wonderful properties of the so-called "silicon steel" have reached us from time to time, and scattered newspaper paragraphs have occasionally lauded the invention, and proclaimed it one of the most valuable processes known to practical metallurgy. But among all the data we have been able to collect on the subject, we have not yet seen a single sensible explanation of the process, nor have we been able to determine what it really is which is said to produce steel of far better quality and at a cheaper cost than that manufactured by the Bessemer process. A careful examination of a pamphlet issued by the Nes Silicon Steel Company throws no light on the subject; and as far as giving, or even attempting to give, any explanation of the theory upon which the patents are based, it begs the whole question, and furnishes instead a very singularly worded puff of the process, while ignoring the subject which, of all others, is what needs elucidation. Accompanying this pamphlet are a few extracts from sundry newspapers, the writers of which are about as well qualified to dilate upon metallurgical subjects as they would be to unravel the hieroglyphics on an Egyptian tomb. The account given by one of these authorities states that the inventor, who is a physician, had been called to visit a lady who had been struck by lightning. Having curiosity to trace the course of the current, it was found that a gun and a dog-chain had been fused by it, when upon examining the melted metal, the doctor was impressed with the "perfect purification and crystallization" which had taken place. The brilliant idea suggested itself of making steel by "subjecting iron, while in a molten state, to currents of electricity"—a vague conception, by the way, utterly devoid of originality. Shortly after this time the doctor chanced to find a piece of ore "resembling the gun-barrel and chain," which he melted in a crucible and ran out a button of fine steel, which upon analysis was found to be "silicon steel"! Subsequent experiments, according to the above authority, proved that by adding fifteen to twenty per cent. of this "silicon steel" to ordinary pig-iron in the puddling furnace, the product will be steel of the finest and best quality.

In another place we are told that this "silicon ore" contains only about fifteen per cent. of iron, while nearly forty-three per cent. is silica. On one page of the pamphlet it is stated that "silicon steel" will sustain a higher degree of heat than any steel made, for the reason that "the carbon being combustible burns out, and leaves nothing but iron, while the silicon being *indestructible by fire* is retained, and the carbon displaced by heating and reheating, when the silicon takes its place, and can be heated one thousand times or more without injury." On the very next page the following remarkable statement is made, flatly contradicting the above paragraph: "The siliceous coating which forms over the metal is an important agent, not only in taking up the impurities, *but is serving the further purpose of keeping in sufficient carbon to make steel*!" Comment on such remarkable discrepancies is needless.

We have a great curiosity to see this "silicon ore," and to know its composition. If the silica and the trifling percentage of iron it contains are all which constitute its valuable qualities—and this is all which is claimed for the ore—we do not see why an admixture of ordinary sand would

not make "silicon steel." In these days of progress inventors should understand that in introducing a process to the attention of a body of men possessing the intelligence which characterizes American ironmasters as a class, a reasonable explanation of the theory of the process should be given. In the absence of this, new inventions are always open to distrust, and are subjected to the suspicion that charlatanism and empiricism are at the bottom of the innovation. The Bessemer, Siemens, and other well-known processes have been fully and intelligibly explained, and their claims to success rest upon sound principles, and are borne out both by theoretical considerations and practical results. The proprietors of the silicon process prefer to use such language as the following: "The use of this ore is so simple, the steel produced by it so uniform and wonderful, and so cheap, that it is looked upon with suspicion and unbelief. The theories, the practices, (*sic*) the science and study of the most eminent metallurgists, the time and millions upon millions of money spent in experimenting, the 3,000 patents and processes for making carbon steel, are all lost by this simple product in nature, which God in His great wisdom made, magnetized, and purified by electricity, and left ready for the use of mankind. Although hidden for ages, it is finally unearthed, while the demand is so great, while the whole country is calling for steel rails and cheap steel and iron!"

—AMONG the mineral products of the South the kaolin deposits of South Carolina and Georgia are destined to attract no little attention. The manifold uses of kaolin in the arts—the demand which exists for it from manufacturers of porcelain, paper, paper-hangings, paint manufacturers, and others—and the increased consumption which other applications have brought about, have caused much inquiry for the material. That this consumption is already very large, is evident from the fact that during the past six months upwards of 2,000 tons of English kaolin have been imported into New York alone. According to Dr. Feuchtwanger, the potteries of Ohio and New Jersey alone consume over 60,000 tons of kaolin per annum. Referring to the subject, the doctor says: "It is a very remarkable fact that the white clay deposits are mostly found near the surface of the earth. But still more remarkable is the existence of those large clay deposits so perfectly free from foreign admixture, and even of remains of the feldspar from which it originated. Analysis of an orthoclase shows a composition of 66 silica, 17 alumina, 3 soda, 9 potash, and 1 water, while albite and oligoclase have about the same composition, with certain differences in the bases. None of the feldspar contains over one per cent. of water, while the analysis of the white clay from South Carolina shows the presence of twelve per cent. of water, and not a trace of potash and soda, and only two per cent. of lime and magnesia; and the silica and alumina in about equal proportion, namely, forty-four per cent. silica, and thirty-nine per cent. alumina. In its physical character the alteration is just as remarkable. Neither mica nor quartz can be detected by the eye or touch. New Jersey clays and the English china clay have the same peculiarity, as proved by their analysis, and a grave question arises how this metamorphosis took place, and how have they disappeared and been replaced by water? In looking among the elements for an agency, we find carbonic acid the only element that could have produced this metamorphosis; but we are puzzled to know by what process, and at what period of decomposition, such a change has taken place."

Dr. Feuchtwanger states that the South Carolina kaolin is fully equal to the famous English china clay, which is so largely exported from Cornwall, and that it is found in much larger beds than is the case with the foreign clays. Several of these southern deposits are from five to ten feet in thickness, and they underlie a great extent of country. As one cubic yard yields 300 cwts. of the fine and pure clay, the supply is practically inexhaustible. The comparative composition of the South Carolina and English clays may be seen from the following table, but it must be remarked that the English clay had been washed, while the American had not.

	<i>English.</i>	<i>South Carolina.</i>
Silica.....	46.32	44.46
Alumina.....	39.74	39.82
Lime and magnesia.....	.80	1.86
Oxide iron.....	.27	.60
Titanic acid.....	.....	.94
Water.....	12.67	12.10

Although kaolin is now mined in several parts of the South, it is probable that increased attention will be paid to the development of this important industry. The price of English kaolin averages \$30 per ton, gold, while the American clay can be bought from \$18 to \$20, currency.

—AT the recent meeting of the American Institute of Mining Engineers, Dr. T. Sterry Hunt explained the new copper process, the joint invention of Mr. Douglass and himself. The essential feature of this process is the dissolving of the oxides of copper by means of a hot solution of protochloride of iron and common salt. In the reaction which takes place the protochloride of iron is converted into peroxide, while the oxides of copper are changed into protochloride and sub-chloride, the latter of which, although insoluble in water, is readily soluble in a strong hot brine. From the solution thus obtained, metallic iron throws down the copper in a metallic state, regenerating the protochloride of iron, which is then ready for the treatment of a fresh portion of oxidized copper ores. In the case of slimy ores the contact of the bath and ore is effected by agitation in tubs; but when the ore is granular, lixiviation in large vats is resorted to. The hot solutions, charged with the chlorides of copper, are digested in tanks with scrap-iron; or better, are made to flow through covered channels containing the scrap-iron, and in their passage lose the whole of their copper, the reaction at the same time evolving so much heat as to keep up the temperature of the liquid. In order to prevent a certain loss of chlorine, which otherwise takes place from the production of some basic ferric chloride in the reaction between the ferrous chloride and the oxides of copper—both protoxide and binoxide being generally present in calcined ores—a portion of sulphurous fumes from the roasting is made to pass through the regenerated bath before adding it to fresh ore. This has hitherto been effected by the aid of a jet of steam.

In recommendation of this process it is claimed that its advantages over other wet methods are that, with the proper management, there is no consumption of chemicals, excepting a little salt to supply unavoidable losses; and that the proportion of metallic iron used is much less than by any other—the large amount of di-chloride of copper obtained in the process yielding two equivalents of metallic copper for each equivalent of metallic iron used. By a modification of the process the whole of the dissolved copper may be converted into the di-chloride. This is effected by causing the hot copper solution to filter—out of contact of the air—through a layer of three or four inches of coarsely-ground copper regulus, or of purple or gray copper ore. The copper from this is rapidly taken up by the protochloride of copper, which is thereby converted into di-chloride.

This process is used in Chili, and also in North Carolina. In the latter State the raw pyritous ores, rich in sulphur, are ground so as to pass through a sieve of twenty or twenty-five meshes to the lineal inch. They are then calcined in three-hearth reverberatory furnaces, care being taken to secure oxidation, but not a dead roast. Each furnace with three hearths, eight by sixteen feet, will roast from two and a half to three tons of ore in twenty-four hours, with a consumption of one-third of a cord of wood per ton. The treatment of the ores in the stirring vat occupies about five hours, and the residues from a five per cent. ore retain from one-third to one-half of one per cent. of copper. The consumption of scrap-iron used to precipitate the copper averages less than seventy per cent. of the fine copper obtained in the form of cement copper, and as this is thrown down from a solution free from per-salts of iron, it is unusually pure.

—A PROCESS for separating silver from lead has been recently patented in England by M. Henry, in which the desilverization of lead is effected by zincing, based upon multiplying the metal surfaces to be acted upon by oxidation. There are three crystallizations of the ternary alloy—lead, silver, and zinc. An acoustic electric signal marks the termination of each stage. The lead, after eliquation, is superheated and showered into a chamber, in which it is treated with superheated air. The products pass into condensation chambers, and the metal flows into moulds which prepare it for transference into boilers or cauldrons into which zinc is introduced. Next, boilers or cauldrons heated by a travelling furnace, receive the metal, which is again zinced, hot air being injected from the stationary furnace. A syphon carries the lead into another receiver. The zinciferous dross may be enriched, remelted, and chloruretted, green timber being used to expedite the process. The rich litharge and the chloruretted litharge may be used for making chloride of lead. The aeriform products of the desilverized lead may be utilized.

—THE copper mines of Chili have been vigorously worked for many years, and large quantities of ores have been shipped abroad to Swansea and other places. Within the past twenty-five years a large increase has taken place in the quantity of regulus and matt produced in the republic, and nearly all the product of the mines is now exported in this concentrated form in lieu of the crude ores which were formerly shipped. In 1870 the exports of metallic copper amounted to 55.36 per cent. of the product, of regulus 41.48 per cent., while only 3.16 per cent. was forwarded in the shape of raw ore. The high price of fuel—coal being worth eight dollars per ton—is a serious drawback to contend against, but by close attention to economy in managing the metallurgical treatment of the ores, even this disadvantage is partially neutralized. The first reverberatory furnace erected in Chili was built in 1837. From 1848 to 1857 the celebrated Mexican and South American Smelting Company smelted large quantities of ores at Herradura, near Coquimbo. The results of these operations were anything but profitable to the stockholders, and yet they were vigorously prosecuted, and a large amount of regulus and ingot copper turned out. There are now in the republic about ninety furnaces making regulus, and about sixty calciners and furnaces making bars and ingots.

Of these, the two largest smelting works are at Lota and Guayacan. The former is owned by a company which is fortunate in owning some coal beds in the vicinity, and owing to the fact that their steamers which carry coal north to the smelting works at the mines return laden with ore, they can afford to smelt a poorer grade of mineral than can be done at the mines. The Guayacan works, which are owned by Messrs. Urmeneta & Errasuriz, are situated on the bay of Herradura, and are said to be among the most extensive in the world. They run seventeen triple hearth calcining furnaces, thirteen smelting reverberatories, and two refining furnaces. When in full blast, these works can produce monthly, from fifteen per cent. ore, regulus bars and ingot copper equivalent to one thousand tons of metal. There are also other furnaces owned by the same proprietors at Cerillos, where the poorer Tomaya ores are smelted into regulus. At Tongoi, there are also works of some importance.

Across the neck of land which divides the bays of Herradura and Coquimbo, at the town of Coquimbo, are the celebrated works of Edwards & Co., where the treatment of the ores is such, and the character of the metal so high, that their bars bring a better price in the English market than those of either Lota or Guayacan. At the *Compañía* works of Mr. Lambert, is the only sulphuric acid chamber in the country. This acid is used in the manufacture of blue vitriol—sulphate of copper—from the carbonate ores of the Panteon mine. The recent increase in the price of copper will doubtless stimulate these mines and smelting works to increased activity.

—REGARDING crystallized or burnt iron, M. Caron advances opinions contrary to generally received notions on this subject. When a bar of good fibrous iron is raised to a welding heat, and allowed to cool in the air, without being hammered, it becomes brittle, and presents an appearance of well-developed crystallization. It is generally supposed that it has absorbed oxygen. M. Caron took a bar of Franche Comté iron, and having ascertained accurately its fibrous properties, broke it into small fragments. Some of these were put in the fire of an ordinary forge and raised to a welding heat; others were placed in a porcelain tube and subjected to the same temperature, in a current of nitrogen or hydrogen. Both being similarly cooled, presented the crystallized appearance of burnt iron; and they showed sensibly the same qualities when broken or forged at a red heat. M. Caron therefore thinks the deterioration due not to the absorption of a particular gas, but simply to the action of heat modifying the molecular constitution. It is further supposed that vibrations render iron crystalline and brittle; but certain recent experiments on railways have proved that the rupture of axles may be always explained either by the bad form of the pieces, or the originally bad quality of the iron before use. The frequent fracture of axles in cold weather, and the crystallized appearance of the broken bars, has led to the supposition that cold is the cause of the crystallization, but there is no proof that the iron was not in this state previously, while the greater hardness of the ground, rigidity of joints, and force of shocks are the more probable cause of such accidents. M. Caron exposed some twenty pieces of the bar referred to, to a temperature varying from zero to thirty degrees, and for a space of more than four months; after which they

presented no difference from the original bar, as regards fracture and resistance, and showed no crystallization. He remarks that these experiments were made with iron of good quality, and does not deny that inferior iron may have its brittleness increased under the influence of cold. M. Caron considers it proved that in every case in which an iron bar breaks, and the fracture indicates crystallization, this quality existed previously, and is not due to working or cold.

—THE immense development of the iron manufacture of Great Britain is shown by the following tabular statements of the number of blast and puddling furnaces:—

BLAST FURNACES.

	<i>Built.</i>	<i>In Blast.</i>
Cleveland	94	94
North-east of England	43	35
North-west of England.....	67	60
South Staffordshire.....	166	104
North Staffordshire.....	42	38
Shropshire.....	30	22
Yorkshire, South and West Riding.....	54	44
Derbyshire	51	42
Northampton and Lincoln.....	26	19
Gloucester, Wilts, etc.....	18	12
North Wales.....	12	7
South Wales and Monmouth.....	188	120
Scotland	154	130
Total.....	945	727

PUDDLING FURNACES.

North of England.....	1,990
North-west of England.....	75
Yorkshire, West Riding.....	305
“ South Riding.....	349
Derbyshire.....	130
South Staffordshire.....	2,049
North Staffordshire.....	444
Shropshire.....	206
Lancashire.....	336
Somersetshire.....	9
North Wales.....	60
South Wales and Monmouth.....	1,338
Scotland.....	565
Total.....	7,856

—THE celebrated Mariposa estate, formerly owned by Gen. J. C. Fremont, has heretofore entailed nothing but disappointment on its proprietors. Included within the 44,350 acres of land which comprises the property, it is claimed that there are no less than 300 miles of quartz veins. Private parties now possess the estate, in which a controlling interest is owned by Mr. Mark Brumagim, and it is the intention to commence mining operations once more, and to develop the lodes as rapidly as possible. Eighty Chinamen were lately sent to Bear valley, who are now engaged in taking rock out of the Pine Tree and Josephine mines there, which are two of the best known openings on the tract. The Benton mill of ninety stamps is being used to crush the quartz. It is said that Mr. Brumagim is endeavoring to perfect arrangements for the employment of 1,000 Chinamen, who will be used in the rough work at the mines, while from 100 to 200 white men will be employed as foremen, mill hands, teamsters, &c. Although Chinese cheap labor is not in favor in that section of California, yet any change is deemed preferable to the utter stagnation and silence which has so long reigned supreme on the estate.

—THE Big Muddy and Mt. Carbon coal of Missouri is spoken of in terms of high encomium by those who have used it. It is highly esteemed by iron manufacturers, producing a brand of metal which sells nearly as well as charcoal iron, and by some ironmasters it is regarded as being fully equal to the celebrated block coal of Indiana.

—CONTINUED experience in the use of the celebrated block coal of Indiana fully justifies the favorable opinions hitherto expressed concerning its value and wonderful purity. A variety of this coal—known as the Staab coal—which is mined in Spencer county, is said to be the finest yet discovered. Its hardness and density are remarkable, and it is almost wholly free from injurious impurities. Analyses by Messrs. Booth & Garrett, of Philadelphia, show that it contains but 0.93 to 0.97 per cent. of sulphur, and only 0.3 per cent. of phosphoric acid. At the old Brazil furnace, Iron Mountain ores, smelted with another variety of block coal, yield a No. 2 pig-iron of the following composition, as reported by Prof. E. P. Cox, State geologist:—

Silicon	1.770
Carbon, combined.....	.700
“ graphitic.....	2.200
Phosphorus .....	.076
Sulphur	a mere trace
Iron, by difference	95.254
	<hr/> 100.000

These figures show what a combination of pure ores and coal of high quality will effect. The great demand which exists for the Indiana block coal is a strong assurance of its value. During the month of February last, one firm shipped to Chicago from Brazil, 3,811 tons, or within a fraction of one acre of coal. To move this mass 316 gondola cars, of twelve tons capacity each, were required.

—IN the Journal of the Iron and Steel Institute, Mr. David Forbes gives a resumé of the manufacture of spiegeleisen on the continent of Europe, in which he calls attention to the following points to be observed in its production: First, the mineral used as a source of manganese should be in itself highly charged with iron, so as to facilitate and ensure the reduction of as large an amount of the manganese contained in it as possible. Second, the charge in the furnace should be highly basic, or, in other words, an excess of limestone, or preferably, burnt lime should be used. Third, the working of the furnace should be much slower than is usual in iron smelting, in order to allow more time for the reduction of the oxides of manganese. Fourth, the temperature of the furnace should be as high as possible, using as hot a blast as can be obtained; and as coke admits the use of a sharper blast, and affords a greater heat, it is to be preferred to charcoal in its manufacture. The following analyses of spiegeleisen from the Siegen district of Germany are given:—

	<i>Hamm.</i>	<i>Hochdahl.</i>
Carbon.....	4.129	5.04
Silicon	0.458	0.41
Sulphur.....	0.015	0.08
Copper.....	0.291	0.16
Manganese.....	8.706	7.57
Iron.....	85.929	86.74
	<hr/> 99.528	<hr/> 100.00

—IN Madison county, Missouri, it is said that a large deposit of emery occurs, but in the absence of reliable data, we give the report for what it may be worth. Fragments of the mineral have been reduced to powder and tested in competition with imported emery, and it is claimed that the results of the test were in favor of the Missouri article. The demand for this mineral is constantly increasing, and if the reports of its existence be correct, and its quality good, the property on which it occurs must possess a high value.

—APPRECIATING the great value of the Bessemer process, the Society of Arts of England has presented the Albert gold medal to Mr. Henry Bessemer “for the eminent services rendered by him to arts, manufactures, and commerce, in developing the manufacture of steel.” This is a merited recognition of the inestimable advantages which have accrued from the labors of Mr. Bessemer in the field of metallurgy.

INSURANCE.

IN the line of State Department management of the accounts of insurance companies, the Michigan commissioner makes a new suggestion. Whether the transfer of the companies' books from their own desks to those of a department will result in more reliable entries and more accurate balances, is a question to which we give no answer; but the new idea in department book-keeping which is put forth in Michigan's second annual insurance report, being in itself more of an error than an absurdity, is at least worthy of criticism.

The commissioner thinks in regard to the reinsurance of risks that the "law should hold the company first receiving premiums to a strict accountability for the reserve thereon." In support of this opinion, that a company should have the reinsurance fund, after it has paid it out in effecting reinsurance, the following is advanced as an argument:—

"Reinsurance of risks by companies is contemplated by the laws of this and all the States having insurance laws. How far this system of transfer and brokerage may be carried with safety, without the intervention of the law to protect the reserve fund, is a question which largely interests the policyholder, not only as to the standing and character of the indorser of the policy he holds, but he is interested to know whether the necessary reserve is maintained on that policy—how much of the premium he paid is actually charged up as liability and held as a reserve by the company first assuming the risk. Prudent forethought would suggest this, as no legitimate surplus balance can be struck until the full measure of liability is deducted. If the demands of the State are just, that a company shall have constantly on hand a stated amount of the premiums obtained on policies in force, to remain in trust and as a liability, does not the present statute conflict with itself in allowing an unlimited reinsurance of risks in other companies, and a consequent depletion of the reserve fund, by a transfer of a portion of the premiums on such risks? The liability of a company first assuming a risk is continuous, and remains a liability during the life of such contract. The liability, unlike the policy and the cash paid for the indorsing company's name, cannot be transferred to other hands. If the liability on the policy does not pass, does not the full per cent. on the original premium received remain a liability also? If the contrary were true, a series of reinsurances would deplete the original reserve demanded by the State, lessening at each transfer, until past discernment.

Illustration of present method of reinsuring risks and in decreasing original amount of reserve fund.

	Risks in force.	Premiums thereon.	Reserve on such premiums.	Loss of assets.	Decrease in liabilities.	Gain in surplus.
December 30, Co. No. 1 has....	\$14,000,000	\$100,000	\$50,000			
December 31, Co. No. 1 reinsures half its business at 30 per cent., and then has.....	7,000,000	50,000	25,000	\$15,000	\$25,000	\$10,000
Company No. 2 has assumed or indorsed for Co. No. 1 of this original business.....	7,000,000	15,000	7,500			

"Now, on this \$14,000,000 of risks in force, and \$100,000 of premiums thereon, the reinsurance or reserve fund contemplated by law to be held as security for policyholders is \$50,000. How much of this sum has actually been returned and charged up as liability—

Company No. 1 vouched for.....	\$25,000
Company No. 2 vouched for.....	7,500
	<hr/>
Total as charged up.....	\$32,500
Original reserve.....	50,000
Loss to reserve fund, which has been paid out in dividends or used to increase surplus.....	\$17,500

"It will be seen at once that a reinsurance by Company No. 2 of risks obtained of No. 1, in Company No. 3, would still further decrease the reserve demanded by law on the original premiums, and by a series of reinsurances the end designed by law to be gained—a reserve of one-half the original premiums paid by policyholders—would be entirely defeated. The law should hold the company first receiving premiums to a strict accountability for the reserve thereon."

This is after the prevailing style—a mixing of matters entirely distinct. A policy liability is one thing, a reinsurance liability is another. An insurance statute, if made with the intelligence and knowledge which should guide its production, will regard the premium reserve simply as what it is, and not manufacture a perversion of it. The premium reserve is a financial or insurance measurement, and not part of what the insurer contracts to do with regard to the policyholder. The legal liability of the original insurer, after he has transferred the risk, is a contingency which may be rated, though we have never seen any data upon which to base the computation. But, whatever may be the rate, it is a question of investment, not of premium. In the rather abnormal illustration of the commissioner, Company No. 1 made a profit of \$10,000 by the transaction, just as much as if the \$25,000 of premium had been invested in railway bonds whose price subsequently advanced; it might in the end lose by the reinsurance, so it might by the bond purchase. When all contingencies are placed in the liability column, these two go in the same class. By the imaginary and impossible rate of No. 2, a loss of \$17,500 of premium reserve is figured up; it would have been as easy to make the loss \$49,000 out of the \$50,000 without any resort to the "series." By the commissioner's plan, the "law" is transcended on the other side, and \$57,500 of reserve is exacted, where but \$50,000 is called for.

The premium is supposed to be adequate to such risk as is carried, and such risk is charged against the premium. Such debit of the premium cannot be elsewhere than where the risk is. If the Michigan department will debit as a liability, according to the percentage, the premium an insured company pays out to exempt itself *from* liability, it must, by the demands of the balance-sheet, give credit as an asset to the reinsurance resource, and so the extra provision comes to nothing; or, in default of this, there is a still worse dilemma: if the department will not recognize the value of the reinsurance, then by its book-keeping it will pronounce a company *insolvent* which, by the law of Michigan and the certificate of the department itself, is *solvent*. What is the next muddle?

—AMONG the recent life insurance devices, that of the Missouri Mutual Life about touches bottom in respect to the matter of affording life insurance to the insured at the nearest approach to the bare death cost. This new system, entitled the Net Premium or Funded Loaded Plan, fully justifies the literal meaning of the first part of its title; it is practically a declaration that, with western rates of interest, the theoretical net premium is already sufficiently loaded for expenses, and that for any rationally possible contingencies, a non-burdensome temporary arrangement suffices. Separating the net premium from the loading, the latter becomes the full premium paid by the policyholder; while in lieu of any loading, and as a safeguard against contingencies, an amount equal to the first premium paid is made a brief debit of the policy—such "funded loading" being subject to quick annual reductions. This attempt to realize the ideal "cost of insurance" is exemplified by a comparison of premium by the new scale with the net premium, or death-loss provision, by Actuaries' mortality 4 per cent., viz.:—

INSURANCE OF \$1,000 AT AGE 35.

	Life. An. Prem.	10 Yr. Endowment. An. Prem.	20 Yr. Endow ^{nt} . An. Prem.
Actuaries' net premium.....	19.87	85.03	38.80
Missouri Mutual gross premium.....	20.11	93.08	39.43

The loading adds variously to the net premium up to about 35 per cent. While discarding this addition, the new scale of the Missouri Mutual is also dividend-paying! dividends following the liquidation of "funded loading," say in five years. To make with such a programme a 4½ per cent. reserve, is certainly placing the possibilities of realized compound interest in a very favorable light. One dollar to-day at 7 per cent., \$1.33 to-day at 4 per cent., are equal in ten years, and having its margin in the interest instead of the principal, the Missouri Mutual proposes to fund net values of policies which, in instances, will be in excess of total premium payments!

—IN seventh annual report of his department, Commissioner George S. Miller, of Connecticut, exhibits statistics of "coöperative life insurance" in that State. Without being any new illustration of the death-contributionship delusion, the report keeps before the public the deficiencies of a project which exceeds in its ill-adjustment of means to ends the old exploded health insurance classes. We therefore cite from it as follows:—

Life insurance upon the coöperative plan is confined in Connecticut to two companies, viz.: The Mutual Benefit Life, of Hartford, and the Connecticut Mutual Benefit, of New Haven; both incorporated in 1869. The character of the business of these companies does not admit of statements being made by them in the usual form, and in lieu thereof statements have been filed in this office giving the balance-sheets of each of the companies, December 31, 1871, and their income and expenditure during the preceding year. The assets of the Mutual Benefit Life, including \$3,341.51 in the hands of agents, amounted to \$4,274.65, and its liabilities were \$852.41, leaving a surplus of assets over liabilities of \$3,422.24. Its income in 1871 was \$8,544.36, and its expenditures were \$11,189.51, showing an excess of expenditures of \$2,645.15.

The assets of the Connecticut Mutual Benefit, including \$2,834.45 in the hands of agents, amounted to \$14,421.61, and its liabilities were \$6,497.89, leaving a surplus of assets over liabilities of \$7,923.72. Its income in 1871 was \$78,826.51, and its expenditures were \$78,035.01, showing an excess of income of \$797.50.

The insured in these companies are separated into divisions, each division being limited to 5,000 members. The Mutual Benefit Life has 1,647 members, in eight divisions; the membership of the several divisions being respectively 161, 202, 286, 199, 57, 203, 356, 183. The Connecticut Mutual Benefit has 2,607 members, in six divisions; the membership of each division being respectively 225, 230, 383, 283, 959, 527. The anomalous character of these companies, their small membership, the limited business transacted by them, the insignificant amount of their assets, and the fact that they are not permitted to transact business in adjoining States, are reasons sufficient to justify a thorough examination and discussion of their merits, their present position and future prospects.

Accompanying the statements of these companies was a blank form of certificate, or policy, issued by them, which contains the contract between the company and the insured. This contract provides that in consideration of a certain payment made by the insured at the issue of the certificate—and certain annual payments thereafter to be made—the company will pay to the beneficiary named in the certificate as many dollars as there shall be members of the division to which the insured belonged, 60 days after satisfactory proof of death. The amount to be paid under the contract is determined by the number of members of the division 60 days after the death of the insured, and not by the number of members at death. This certificate also contains conditions and agreements to which the assured assents when he accepts the certificate, and by which he is bound. The first condition provides that the insured shall forward to the company one dollar and ten cents within 40 days after due notice of the death of a member of his division; and that if said sum is not received by the company within 40 days from the date of the notice, the certificate of membership shall be void and the insured cease to be a member of the company. The second condition

provides that depositing a written or printed notice in the post-office, properly addressed, shall be deemed legal notice.

In the ingeniously constructed certificate, bearing conspicuously upon its face the figures \$5,000, and well calculated to convey the impression that the person holding the same is insured for that amount, the company assumes no liability, promises no payment, and fulfils its entire obligation by the payment, at the end of 60 days, of such sum as has been received within 40 days. It is apparent that the sum paid by the company depends entirely upon the voluntary contributions of the members of the division to which the insured belonged. If the deceased belonged to the largest division in either of these companies, and all its members paid their assessments, only \$958 would be received; while if he was a member of another division, but \$56 would be received. Such results manifestly do not realize the expectations of the insured. The uncertainty of its membership, the impossibility of filling its divisions or keeping them full, the absence of guarantee or obligation on the part of members to pay their assessments, and the non-assumption of liability by the company, all combine to render definite results impossible, and therefore to make the insurance valueless.

—AMONG the new English companies recently registered, we notice the Wesleyan Methodist Trust Assurance Company. Capital £25,000; shares, £10 each. Object: To make insurances "against loss or damage by fire or other risk analogous, or otherwise," upon all real estate, furniture, and other property belonging to the denomination. This is probably a private enterprise in a denominational direction. In the United States the Methodist organization has so far rejected any such scheme as part of its general financial arrangement. The English project calls for a directory composed exclusively of Methodists, and one-third ministers. We heard a distinguished clergyman say upon a certain occasion that ministers make poor financiers, and the reason is equally as cogent which repudiates denominationalism as a business basis. We fail to appreciate the logic which links Arminianism to average, preferring the principle of rendering unto Cæsar the things of Cæsar. The latter gives us the guarantee of fitness; the former shows its insurance qualifications by a programme of objects beyond the range of underwriting data.

Special class insurance may have its advantages: that is to say, if all the grocers in the country were to combine to insure the general grocery business—if groceries alone were really to bear the fire risk of groceries—the arrangement conducted by grocers educated as underwriters, there would come a more exact valuation of the fire risk cost of such merchandise, resulting in numerous subdivisions of the general subject, affording valuable fire insurance data, causing some grocers to pay higher rates, others lower rates than they now do, and by bringing the grocery trade under closer supervision (actuated by the love which two of a trade bear to each other), establishing an inquisition over the trade moralities, would possibly effect an infinitesimal reduction in the *average* premium, if the great grocery company did not smash up, which, however, it would be likely to do, having for its end the moral—let the grocer stick to his sugar as the shoemaker to his last.

Self-insurance by grand proprietaries has a greater diversity of hazard than an exclusive class insurance, with not enough of each kind for average contribution. Then, the actual distribution of the property may not comport with the proper insurance distribution, and the first thing the self-insurer will do when he learns his new business, will be to violate his own position and effect reinsurance!

Now and then there is a spasm, and some class or city gets an insurance fit, going into this business instead of manufacturing or farming; but why not doing its own manufacturing or farming as well as its own insurance we do not understand. We have always advocated the extension of the insurance principle—believe that now it is but in the initiate stages of its application—but perversions of it are very injurious delusions. Amateur underwriting is a more grotesque and costly joke than amateur farming.

—THE second annual report of the Michigan commissioner of insurance, Hon. Samuel H. Row, has been received. Elsewhere we have run counter to an opinion pronounced by the commissioner, but in all the essentials which go to make up a report of this nature, the Michigan commissioner has done his work well. It has the first excellence of making fit the local insurance

statistics; of being chiefly an exhibit of insurance in Michigan. In addition to all the underwriting details within the reach of the commissioner, there is a most thorough exhibit of the Michigan fires last October, a calculation and classification of properties and lives destroyed in the respective localities, with losses of the respective companies, &c. Mr. Row's supplemental Chicago report was a meritorious contribution to the history of the most important of insurance events, and the present report gives additional proof that Commissioner Row does not fail to appreciate the real utilities of his office. We make the following abstract:—

The number of fire and fire-marine insurance companies authorized to do business in Michigan during 1871, as enumerated in the last annual report, was 122.

The changes which took place last year in insurance capital generally, affected Michigan, both in financial loss to home corporations, by the decrease in the number of companies from other States, and in the withdrawal of insurance capital from her borders. The number of companies withdrawn is 45, and of new admitted during the year is 30. The number of companies now authorized to transact fire and fire-marine insurance business in this State for the year current is 117.

AUTHORIZED IN 1871.		No.	AUTHORIZED IN 1872.		No.
California.....		5	California.....		1
Connecticut.....		9	Connecticut.....		6
Great Britain.....		5	Great Britain.....		5
Illinois.....		6	Illinois.....		1
Maine.....		0	Maine.....		2
Massachusetts.....		5	Massachusetts.....		4
Michigan.....		230	Michigan.....		232
Minnesota.....		0	Minnesota.....		1
Missouri.....		1	Missouri.....		3
New Jersey.....		0	New Jersey.....		1
New York.....		42	New York.....		40
Ohio.....		9	Ohio.....		10
Pennsylvania.....		3	Pennsylvania.....		6
Rhode Island.....		7	Rhode Island.....		4
Wisconsin.....		0	Wisconsin.....		1
Total.....		122	Total.....		117

MICHIGAN STOCK COMPANIES.

ORGANIZED.		Risks written in Michigan during 1871.	PREMIUM RECEIPTS IN MICHIGAN DURING 1871.		
			Fire.	Marine.	Total.
1866	Detroit F. & M., Detroit, - -	\$12,461,893 00	\$112,876 30	\$64,721 19	\$177,597 49
1864	Michigan State, Adrain, - -	5,466,123 00	61,457 01		61,457 01
1863	State, Lansing, - - - -	973,185 00	11,653 57		11,653 57
	Total, . .	*\$18,901,201 00	\$185,986 88	\$64,721 19	\$250,708 07

a Includes 27 farmers' mutual fire insurance companies. b Includes 29 farmers' mutual fire insurance companies.

* Fire risks.....\$15,711,311 00
Inland risks.....3,189,890 00
\$18,901,201 00

MICHIGAN STOCK COMPANIES—Continued.

ORGANIZED.		LOSSES IN MICHIGAN DURING 1871.			
		PAID.			INCURRED.
		Fire.	Marine.	Total.	
1866	Detroit F. & M., Detroit, - - -	\$81,114 85	\$13,787 45	94,902 30	\$129,903 38
1864	Michigan State, Adrain, - - -	17,185 45	.....	17,185 45	54,311 56
1863	State, Lansing, - - - - -	8,703 24	.....	8,703 24	15,454 62
	Total, . . .	\$107,003 54	\$13,787 45	\$120,790 99	\$199,669 56

COMPARISON 1870—1871

Of the business done in the State of Michigan during the year 1871, by the Michigan stock fire and fire-marine insurance companies, the following is a synopsis:—

Total premiums received 1871.....	\$250,708 07
Premium receipts 1870.....	227,236 49
Increase over receipts of 1870.....	\$23,471 58
Amount of fire losses paid.....	\$107,003 54
Amount of inland losses paid.....	13,787 45
Total losses paid.....	\$120,790 99
Losses paid in 1870.....	131,843 44
Decrease of losses paid.....	\$11,052 45
Excess of premium receipts over losses paid.....	\$129,917 08

Estimating thirty per cent. of the premium receipts (in Michigan only, above given) as expenses of business, and deducting the amount (\$75,212.42) from the above excess, these companies have remaining as the net profit on the premium receipts on Michigan business, the sum of \$54,704.66, being 21 $\frac{1}{10}$ per cent.

INCOME.

For 1870, \$283,791.12; for 1871, \$314,795.75. Increase for 1871, \$31,004.63.

MICHIGAN MUTUAL FIRE INSURANCE COMPANIES.

At the date of my last report the number of mutual fire insurance companies of this State doing business herein was twenty-eight. Since the date above referred to, a mutual fire insurance company has been organized at Ionia, limited in its risks to Ionia and Montcalm counties. One other company, limited to Gratiot and Isabella counties, is being organized, the charter of the same having been duly approved and filed.

The whole number of members belonging to the mutual fire insurance companies of the State at the close of the year was 35,876, of which number 5,243 were added during the year. The whole amount of property at risk in said companies was \$69,666,180.81, of which \$9,996,340.91 were risks written during the year.

Amount of losses paid during the year.....	\$85,164 88
Paid for salaries, fees, etc.....	20,660 78

Aggregate expenditures.....\$105,825 66

LIABILITIES.		
Claims for losses due.....		\$16,978 76
Claims not matured.....		31,458 13
Claims resisted.....		1,189 00
Aggregate.....		\$49,625 89

The mutual companies did not suffer any considerable loss by the October fires, as, with the exception of the Lapeer and Tuscola counties Farmers' Mutual, none of them were doing business within the territory traversed thereby. A comparison of the annual statements received for the year 1870, with those on file for the year 1871, discloses the following favorable result, viz:—

	1870.	1871.
Risks written during the year.....	\$8,269,882 59	\$9,996,340 91
EXPENDITURES.		
For salaries, fees, etc.....	\$21,714 16	\$20,660 78
For losses.....	90,647 00	85,164 88
Aggregate expenditures.....	\$112,361 16	\$105,285 66
Assessments levied during the year.....	\$112,211 93	\$111,247 74
Assessments collected during the year.....	89,700 15	78,428 93

It will be seen that the risks written during 1871 exceed those written in 1870, in the aggregate, \$1,726,458.32, while the expenses of the companies for salaries, fees, etc., were decreased more than \$1,000; and, notwithstanding the largely increased amount at risk, the losses paid by these companies have decreased \$5,482.12, being more than 6 per cent. less than the losses paid in 1870. The average rate per cent. of assessments levied for the year 1871 to defray the entire expenditures of the mutual companies, as appears from their reports, is fifteen-hundredths of one per cent. The practice of some companies in assessing the losses of the year at its close, to be collected during the first sixty days of the ensuing year, is one which gives their liabilities an undue prominence as compared with the cash premiums on hand.

COMPANIES OF OTHER STATES, &c.

Business done in Michigan during the year 1871 by fire insurance companies of other States and foreign governments:—

Fire risks written by companies of other States.....	\$100,564,526 05
Inland risks written by companies of other States.....	1,004,670 00
Fire risks written by companies of foreign governments.....	15,999,546 58
Inland risks written by foreign companies.....	None.
Aggregate amount of risks written by companies of other States and foreign governments.....	\$117,568,742 63
Fire premiums received by companies of other States.....	\$1,187,389 97
Inland premiums received by companies of other States.....	9,779 48
Fire premiums received by foreign companies.....	199,629 72
Inland premiums received by foreign companies.....	None.
Total.....	\$1,396,799 17
Amount of fire losses paid by companies of other States.....	\$674,805 95
Amount of inland losses paid by companies of other States.....	10,537 23
By foreign companies.....	136,812 75
Total losses paid.....	\$822,155 93

A review of the business of the fire and fire-marine insurance companies of other States in Michigan, during the year 1871, presents the following noticeable items: Of 101 companies authorized to transact business in this State during the year, only 51 report the business of the year; 45 companies (named elsewhere), authorized in 1871, furnish no report of their business, and are not now authorized to do business in this State. The entire risks written in Michigan by the companies of

other States, as tabulated, amount in the aggregate to \$101,569,197, including inland navigation risks written by four companies, amounting to \$1,004,670. The total premium income of these companies was, on

Fire risks.....	\$1,187,389 97
Fire-marine risks.....	9,779 48
Total premium income.....	\$1,197,169 45
Fire losses paid.....	\$674,805 95
Marine losses paid.....	10,537 23
Total losses paid.....	\$685,343 18
Aggregate receipts over losses.....	\$511,826 27

Estimating thirty per cent. of the premium receipts of these companies as necessary to cover the expense incurred in getting the business, the per cent. of profit on the aggregate was 12 $\frac{3}{4}$. The same estimate in regard to the marine receipts and expenditures, shows a loss in the marine business alone of \$3,691.59, or more than 37 per cent. in excess of the entire marine premium income reported by them. It is worthy of note that this is the exact per cent. of loss sustained on the inland business by companies of other States in Michigan in 1870. The profit on fire premiums alone was over 13 per cent.

FOREIGN COMPANIES.

From the statements of these companies, it appears that their entire premium receipts in this State were \$199,629.92, and their losses paid amount to \$136,812.75. Aggregate receipts over losses, \$62,816.97. If to the losses paid we add 30 per cent. of the premium receipts as expense of business, and deduct the aggregate, \$196,701:66, from the premium income, a net profit remains of \$2,928.06, or 1 $\frac{1}{16}$ per cent.

MICHIGAN FIRES.

The days of October 8th and 9th, 1871, have passed into history as the most memorable in the aggregate loss of property, the bankruptcy of insurance companies, and the widespread desolation and ruin which followed the track of fire. These days have an added significance to the people of this State. *"In Wisconsin the widespread conflagration was attended with a most fearful loss of life. While the people of Michigan were engaged in the noble work of furnishing relief to the sufferers in Chicago, the same devouring element was making sad havoc in our own State.—Thriving towns, farm and school houses, churches, stock, crops, and thousands of acres of valuable timber were consumed. Nearly three thousand families, or about eighteen thousand persons, were rendered houseless, and deprived of the necessities of life."

The exact value of property burned in Michigan, and the estimate of loss in detention of improvements and the general effect on the financial prosperity of the State, like the value of lives lost, and the attendant suffering and misery endured, cannot be computed. Scarcely a county escaped the ravages of the flames. Aside from the localities where whole cities and villages were swept away by the fiery cyclone, the losses in produce, fences, live stock, timber, and farm dwellings and buildings in the counties of Bay, Gratiot, Isabella, Iosco, Lapeer, Menominee, Oceana, St. Clair, and Saginaw, were the most severe. The losses in the townships of Fillmore and Laketown, Allegan county; the almost complete destruction of the city of Manistee, in Manistee county; Holland City, in Ottawa county, both near the shore of Lake Michigan; and of the villages of Sand Beach, Port Hope, White Rock, Elm Creek, Forest Bay, and Huron City, in Huron county; † Forestville and the adjacent townships in Sanilac county, on the Lake Huron shore, render a collection of statistics of the loss on insurable property, in the sections last named, pertinent to this report, in connection with the losses thereon sustained by insurance companies. The figures presented have been collected from the most available sources, by correspondence with parties of known responsibility, residents of the burnt districts, and are believed to be correct estimates of the

* Governor's message; March 13, 1872, to Michigan legislature (extra session).

† Delaware township.

losses on the classes of property enumerated. These statistics, relating to the localities mentioned, are detailed in the tables, from which is taken the following

SUMMARY.

The number of persons burned to death, or whose deaths were directly traceable to the effects of the fire, was twenty-one—of which ten were males and eleven females. The record of human suffering, of heroic bravery, and manly endurance, has been written elsewhere, and does not belong to the dry details of statistics, were it possible to reduce it to figures.

Dwellings burned, 1,147; value with contents.....	\$829,116
School-houses burned, 28; value with contents.....	11,255
Churches burned, 8; value with contents.....	36,200
Hotels burned, 12; value with contents.....	33,100
Stores and offices burned, 130; value with contents.....	526,792
Mills burned, 34; value with contents.....	414,500
Sawed lumber.....	87,502
Docks, 20; value with contents.....	72,100
Machine shop burned, 1.....	10,000
Vessels burned, 1.....	10,000
Saloons burned, 14.....	14,000
Barns—value with contents.....	37,143
Produce.....	115,736
Tannery.....	10,000
Shops.....	\$25,000
Salt works.....	7,000
Fences.....	57,287
Shingles, etc.....	13,572
Live stock.....	2,500
Miscellaneous.....	33,610
Aggregate.....	\$2,346,413

PREMIUM RATES.

A comparison of the average premium rate received by each company on the entire business of the year, with the average rate received during the same period in Michigan by such companies, will be of interest to insurance men, and is worthy of careful study by the insured. The average premium rate received by Michigan companies on the entire business was 1.17, and on business in Michigan alone 1.31. The average premium rate of companies of other States on the entire business of 1871 is 1 per cent., while the rate realized in Michigan is 1.17. The above average includes both the fire, marine, and inland business of the companies. The highest average premium fire rate realized by any one company in Michigan last year was 2.34, the lowest was .33. The highest inland navigation rate was 6.37, and the lowest .06. These computations of Michigan rates are based on the sworn statements filed with the State treasurer, of premiums received and secured, on which the taxes are computed. Courtesy demands that the conclusion should be drawn that some companies are doing business at exceedingly low rates, rather than that they have not returned the full amount of the cash and notes received as premiums in the State.

Table comparing average premium rate for the entire business of 1871, with average premium rate received in Michigan during 1871, by the stock fire insurance companies doing business therein.

MICHIGAN COMPANIES.			Prem. rate for entire business.	Premium rate in Michigan.
	Prem. rate for entire business.	Premium rate in Michigan.		
Home, Columbus.....	1.00	1.12		
Home, N.Y.....	0.85 n	1.31		
Howard, N.Y.....	0.59 o	0.95		
Insurance Co. N. America, Phila.....	1.00 p	1.35		
International, N.Y.....	1.03	1.25		
Detroit Fire & Marine, Detroit..	1.18 a	1.42 b		
Michigan State, Adrain.....	1.11	1.12		
State, Lahsing.....	1.19	1.19		

a average fire rate, 1.07; average inland marine rate, 1.72.
b average fire rate, 1.21; average inland marine rate, 5.02

n Fire rate, 0.85; marine rate, 0.51.
o Fire rate, 0.58; marine rate, 0.65.
p Fire rate, 1.03; marine rate, 0.95.

COMPANIES OF OTHER STATES.

	Prem. rate for entire business.	Premium rate in Michigan.		Prem. rate for entire business.	Premium rate in Michigan.
Aetna, Hartford.....	1.05 c	1.19 d	Mercantile, N.Y.....	0.50	1.22
Agricultural, Watertown.....	0.71	0.34	Merchants', Providence.....	1.00 q	1.15
Alemania, Cleveland.....	0.89	1.29	Narragansett F. & M. Providence	0.92 r	1.91
Amazon, Cincinnati.....	1.22 e	2.70 f	National Fire, N.Y.....	0.50	1.08
American, Chicago.....	0.58	0.51	National, Boston.....	1.13 s	1.16
American Central, St. Louis....	1.05 g	1.54	Newport F. & M., Newport....	0.73 t	0.90
Andes, Cincinnati.....	1.47 h	1.36	N. Y. Central, Union Springs...	0.78	1.01
Buffalo German, Buffalo.....	0.85	1.20	Niagara, N.Y.....	0.85 u	1.42
Citizens', N.Y.....	0.51	1.04	Pennsylvania, Philadelphia....	0.81	1.76
Commerce, Albany.....	0.86	1.34	Peoples Fire, Worcester.....	1.13	1.47
Commerce Fire, N.Y.....	0.43 i	1.14	Phenix, Brooklyn.....	0.91 v	1.36 w
Continental, N.Y.....	0.66	0.68	Phoenix, Hartford.....	1.17	1.21
Exchange Fire, N.Y.....	0.92 j	0.68	Relief, N.Y.....	0.62	1.07
Firemen's, N.Y.....	0.78	1.23	Republic Fire, N.Y.....	1.04 x	1.42
Firemen's Fund, San Francisco..	0.97 k	1.21	Springfield F. & M., Springfield	1.06	1.31
Franklin Fire, Philadelphia....	1.07	1.45	Standard, N.Y.....	0.57	1.01
Germania, N.Y.....	0.84 l	1.42	Star Fire, N.Y.....	0.75	1.65
Girard Fire & Marine, Phila....	0.99	1.09	St. Nicholas, N.Y.....	0.66	0.33
Glens Falls, Glens Falls.....	0.82	1.39	Sun, Cleveland.....	1.02	1.18
Hanover, N.Y.....	1.00 m	1.42	Tradesmen's Fire, N.Y.....	0.59 y	1.53
Hartford Fire, Hartford.....		1.20	Triumph, Cincinnati.....	1.09 z	1.92 *
Hibernia, Cleveland.....	1.08	1.35	Union, San Francisco.....	0.91 †	1.28
Hoffman Fire, N.Y.....	1.09	1.85	Watertown, Watertown.....	0.85	0.66
			Totals of other States.....	1.00	1.17

—THE following circular has been issued by the executive committee of the Knickerbocker Life Insurance Company. It announces a change in the presidency, a partially new directory, and the purpose of the management to extend the business, in so far as extension means the increase of first-class risks—not otherwise. As a company not much given to official changes, not exhibiting in its history the transitions of ephemeral officary, a new administration in the Knickerbocker naturally marks a new era, and will draw fresh attention to the company. Mr. Lyman retires after a presidency of nearly twenty years. Mr. Stanton succeeds to the presidency after a vice-presidency of nine years; and the old Knickerbocker, in the next twenty years, will be likely to repeat the steady on-going of the past.

OFFICE OF THE KNICKERBOCKER LIFE INSURANCE CO.,
No. 239 BROADWAY, NEW YORK, July 9th, 1872.

Dear Sir:—With this date, as will be seen by the accompanying circular, a change takes place in the presidency of this company. Several new directors have also recently been elected, who are men of high character and standing in the community, and whose business habits and capacity the undersigned believe cannot fail to give the company increased confidence with the public. The new directors have already taken, and will continue to take an active part in the management of its affairs.

These changes, the undersigned trust, will give rise to increased zeal and activity on the part of the agents of the company, and those who are insured in it, in aiding to promote its prosperity. While much will naturally be expected of agents, the management are not without hope that they may receive valuable aid from policyholders. As most of them are entitled to participate in the profits of the business, they are directly interested in increasing it. This they can do in many ways, but more especially by presenting the advantages of an insurance in this company to their friends and acquaintances, as opportunity may offer.

c Fire rate, 1.06; marine rate, 1.03.
d Fire rate, 1.20; marine rate, 0.06.
e Fire rate, 1.12; marine rate, 1.89.
f Fire rate, 2.34; marine rate, 6.37.
g Fire rate, 1.22; marine rate, 0.65.
h Fire rate, 1.51; marine rate, 0.88.
i Fire rate, 0.43; marine rate, 0.35.
j Fire rate, 0.90; marine rate, 3.77.
k Fire rate, 0.96; marine rate, 1.00.
l Fire rate, 0.84; marine rate, 0.73.
m Fire rate, 1.01; marine rate, 0.76.

q Fire rate, 1.05; marine rate, 0.62.
r Fire rate, 1.09; marine rate, 0.75.
s Fire rate, 0.95; marine rate, 1.33.
t Fire rate, 1.02; marine rate, 0.63.
u Fire rate, 0.85; marine rate, 0.83.
v Fire rate, 0.89; marine rate, 0.96.
w Fire rate, 1.36; marine rate, 1.61.
x Fire rate, 1.05; marine rate, 0.82.
y Fire rate, 0.59; marine rate, 0.53.
z Fire rate, 0.94; marine rate, 1.47.
* Fire rate, 1.73; marine rate, 0.44.
† Fire rate, 0.76; marine rate, 1.14.

From the agents of the company the management will expect increased exertions to obtain new business, as well as to retain that heretofore secured. In their efforts to that end, however, they cannot exercise too much caution in obtaining new risks. A hundred first-class risks will add more to the permanent prosperity of the company, than double that number of doubtful ones. While, therefore, the undersigned earnestly hope that the close of the present year may witness a large increase in the number of insurers in the company, they trust that the risks may be of such a character as may tend to increase the confidence of the directors in the vigilance and fidelity of their agents.

Respectfully, yours,

C. STANTON, President,
R. S. BUSSING,
S. F. GOODRIDGE,
HUGH ALLEN,
Executive Committee.

OFFICE OF THE KNICKERBOCKER LIFE INSURANCE CO.,
No. 239 BROADWAY, NEW YORK, July 9th, 1872.

Owing to continued ill health, and the necessity of seeking relief from the cares of the position he has so long occupied, and in accordance with an intention formed some months since, the undersigned has resigned the office of president of the Knickerbocker Life Insurance Company, to take effect this day. In taking leave *officially* of the patrons and agents of the company, he begs to assure them that he by no means ceases to be interested in its welfare and prosperity, but that as far as his health and strength permit, he shall continue, by his influence and exertions, to aid in promoting its success. He will be succeeded in office by Charles Stanton, Esq., (of the old and well-known firm of Stanton, Sheldon & Co., of this city,) who has for many years been the vice-president of the company, and to whom its sound and prosperous financial condition is largely due.

From his long and intimate acquaintance with Mr. Stanton, and his knowledge of his indomitable energy, his business habits and capacity, his large experience, and his fidelity to trust, the undersigned feels confident that the business and affairs of the company will be so managed that its present prosperous condition will be continued, and he therefore takes great pleasure in commending him to the agents of the company, and those who are insured in it, as an officer entitled to their confidence, and their cordial coöperation and support.

ERASTUS LYMAN.

—As there is just now something of a substitution of legitimate life insurance by coöperative devices, a few plain facts seem to be called for to present them to the consideration of those who are, or might be, misled by the pretences of coöperation. This project takes two guises at present: 1st, a simple death contributionship by a class of persons upon the decease of one of their members, and 2d, a policy sum with annual dues and death assessment combined. The first plan can name no definite sum as assured; the second names a sum without adequate provision for its ultimate payment. By the first, each member takes an unequal chance to draw a prize, or a blank—rate alike, risk not alike—and whether a member outlives the payers, or dies in the harvest of payments, he has his chance as it is made for him in a programme, by which the more you pay the less you receive. The second plan veils the mischance of no insurance after much payment, by promising a fixed sum to be paid at death, and promises this without making provision for it.

Such expedients have their temporary run—we presume they will last for two or three years—owing to a misunderstanding of the basis of life insurance. The whole thing is a mere supposition that life insurance can be had at half its cost; and the arguments, figures, statements, and calculations, by which it is bolstered up, vanish the moment the test is applied, by contrasting what it does cost to insure life—the life of *every* premium payer—with what it is attempted to do it for.

It should be understood that no company, whether life insurance or coöperative, can pay out beyond its receipts; and when great sums paid for losses are paraded in triumphant contrast with small sums received for premium, they simply disclose a wide gap between receipts and outgo, which must be filled up somehow by the day of reckoning, unless that day should prove a bankruptcy consummated and a delusion overthrown.

The coöperative deluders deal largely in the fact that the life premiums are greatly in excess of the losses. In honest life insurance, payment of present losses is a small concern; the vast millions of future losses is the great consideration. Life insurance works for the possibilities of the un-reached years. Coöperation is for the present a makeshift—for the future a blank.

Life insurance is accumulative; accumulation is its first, its chief, its greatest business; it has to

do this to be honest, and for this coöperation assails it. Where there is no reserve proportionate to the business, the insurance is a fraud. The cheapness of coöperation is at the expense of a reserve; it is a kind of year-by-year insurance with a hap-hazard premium, without definite death-rate, carried on under an imaginary programme, in which ten or fifteen years' difference in age makes no difference in mortality. The contrivance starts wrong and gets worse as it proceeds. In a pamphlet of one of these concerns we have as its standard of mortality the percentage of deaths to policy in force, according to the New York insurance reports! This kind of dying-in-a-lump death ratio would seem to be the climax of extravagant assumptions, yet it is more than paralleled in systematic beauty by the wonderful arithmetic which makes 2 and 2 count 8, and in doing so makes 8 "very cheap": pays out \$2,000 for so cheap as \$10, and will have lots of money for people who ain't dead yet!

X—AUDITOR LIPPINCOTT, the State insurance officer of Illinois, "speaks out in meeting" in regard to the insurance legislation which culminates in special State insurance supervision. He says: "Of all mistakes committed by State legislatures in this country, the creation of exclusive departments for the sole supervision of insurance business is the greatest."

"I do not believe that departments created for its special supervision either build up or protect it. Such departments seem, in their very natures, to tend more to destroy this great business than otherwise. The connection between department and company should be, and when properly conducted is, simple and plain. Figures and evidences of investment are as readily comprehended by the man of ordinary good sense and education as they are by the most accomplished underwriter in the country. And, extraordinary as the statement may appear to some persons, this is *all* that is required to judge as to the *soundness* of an insurance company of any kind. The same ability that enables an auditor to accomplish the duties of his office, will enable him to perform equally well the examination of accounts (statements and their accompanying vouchers are nothing else) of insurance companies."

One extreme serves as a corrective of its opposite. The lengths to which State insurance supervision has been pushed; the false ideas of State relations to trade it has tried to carry out; its absurd attempts to extend the State authority over a corporation to the personal citizen, are aiding the developments of the New York department investigation in bringing the subject into disgrace. While we have always rejected the exaggerated department scope—almost universally applauded a few years since—we do not concur in the present tendency to ignore the utility of a proper State bureau, and we would as soon think of annexing an agricultural bureau to the auditor's department as we would an insurance bureau. Mr. Lippincott is right in so far as regards proper connection between company and department as being simple and plain, but the data registered should be considered not only as financial accounts, but as useful in promoting the security itself. We want a State registration which, while recognizing the distinctive requirements of the divisions of underwriting, will have its functions entirely engrossed by two ideas, viz.—Standard and Statement; the former as brief and comprehensive as effective testing will admit of; the latter as elaborate in classification and detail as shall prove practicable and serviceable—consequently not trespassing beyond the demands of the standard. X

—THE organization of the Armenia Insurance Company of Pittsburgh is completed, and capital to the amount of \$250,000 paid up. This is the first instance of a western Pennsylvania company starting with a paid-up capital equal to \$250,000. The Armenia marks an era in Pittsburgh insurance, the second city of Pennsylvania, dating from this organization, a much greater importance as an insurance centre. The locality is strong in all the elements of capital and business which make the underwriting basis, and so great a manufacturing city should have local insurance institutions commensurate with the wealth of her industries. The Armenia is an evidence that past omission will be rectified. Projected by a skilful underwriter of long experience, under the auspices of some of the first men of the city, the Armenia is no feeble experiment, but exerts the power and influence of large combined resources. The directory recently elected is a good representation of the iron, oil, lumber, banking, and other interests of Pittsburgh, as will be seen by the list of names. The board is composed of the following gentlemen:—

S. S. D. Thompson,
T. Brent Swearingen,
Alexander Patterson,
John D. Scully,
Wm. P. Logan,
Jacob H. Walter,
Jacob Kopp,

Charles Zug,
Hugh McNeill,
A. Weise,
John Heath,
C. L. Straub,
Henry Warner,
John H. McCreery,

Isaac Stewart,
James Laughlin, Jr.,
R. S. Waring,
Joseph Phillips,
Robert H. Dalzell,
Joseph M. Gazzam,
John A. Myler.

The board selected S. S. D. Thompson, Esq., as president, and T. Brent Swearingen, Esq., as secretary. Both these gentlemen are Pittsburgh underwriters, have each represented first-class companies in that city for some years, and their qualifications for their positions are beyond dispute.

—We presume that the Continental Fire Insurance Company of New York has reached the final twist in the gymnastics of its scrip cancellation. This company had at the close of 1870, \$723,094 of scrip not forfeited or redeemed. Its Chicago loss was \$1,550,187—latest figures per Illinois auditor's report. In January last, the scrip, excepting a small sum, was obliterated in the returns made to the State departments as being "cancelled by the Chicago loss"—the New York superintendent issuing a certificate to that effect. Presto! the scrip was not cancelled—that is, a sort of not cancelled, viz.: The fiscal year ended July 1st; "the technical cancellation was necessarily deferred until the close of the fiscal year within which the loss occurred, in order that the results of the year could be known to justify that action." So it appears to have been necessary to justify the statement cancellation, though the New York superintendent, "after making examination into the facts, had issued a certificate to that effect." Had the scrip gone to the departments, there would have been an ugly capital impairment of over half a million! By July 1st, the hope of rescue was all gone, the fiscal year ending in a stated loss of \$244,609.04, in addition to the scrip fund; and under date of July 11th, the scrip issues from 1856 to 1871, inclusive, are declared cancelled, without any technical reservation. We are informed that the "committee appointed to investigate the effect of the Chicago fire upon the outstanding scrip fund, decided each questionable point in favor of the scripholders," but are not apprised whether the decision was made before July last, or before the previous January.

—THE following insurance law was enacted at the last session of the New York legislature. Passed March 9, 1872:—

Section 1. It shall be lawful for any life insurance company, organized under the laws of this State, to ascertain at any given time, and from time to time, the proportion of surplus accruing to each policy from the date of the last to the date of the next succeeding premium payment, and to distribute the proportion, found to be equitable, either in cash, in reduction of premium, or in reversionary insurance, payable with the policy, and upon the same conditions as therein expressed at the next succeeding date of such payment; anything in the charter of any such company to the contrary notwithstanding.

—THE State, special, and supervising insurance agents of Iowa, Nebraska, Missouri, and Kansas, met in Des Moines on Wednesday, July 24th, to perfect the organization of the Western Underwriters' Union. Twenty members were present. In accordance with the recommendation of the National board, it was agreed to form a board of those agents having jurisdiction in Iowa and Nebraska, and another for Missouri and Kansas. The board for Iowa and Nebraska was then organized with the following officers: President, J. O. Wilson; Secretary, R. C. Innes; Executive Committee, James Plaister, H. N. Chittenden, F. J. Cressey.

—IT was resolved, July 16th, by the Boston Fire Underwriters' Union, "that all the members of this board, as a matter of honor, adopt and follow the rates reported at this meeting, by the committee to whom the subject was referred, viz.: On wholesale stocks, in package, 50 cents; on jobbing stocks, open, 60 cents; on retail stocks, 75 cents. And that all of the Boston fire underwriters be requested to observe the tariff of 1868 until a new one is established; also to observe the tariffs established in other localities."

—THE fire destruction continues without abatement—July perhaps surpassing any previous month of the year. There has been more anxiety than usual manifested by the public as to the condition of the fire insurance offices.

—FROM base to apex the Globe Fire Insurance Company of Chicago has been reconstructed, changed in its officary and its financial basis, and its business revised. New directors were elected in May, and the following gentlemen selected as officers: George K. Clark, president; C. H. Sandborn, vice-president; Jno. A. Gates, secretary; Walter Kimball, treasurer. On all sides the worth and ability of this official staff is conceded. It combines business success, underwriting experience, and financial responsibility. Mr. Clark, president, is well known as a successful lawyer of Chicago, prosperous as a real estate dealer, and ranks as a business man of the highest order. Mr. Sandborn is a professional underwriter of capacity and diversified practice. Mr. Gates, secretary, who is not without practice in the secretaryship of a fire insurance company, resigned the special agency of the western department of the Hartford fire to enter the service of the Globe. He has had the outstanding risks of the Globe resurveyed and pruned. Treasurer Kimball is a large real estate owner, and has been city comptroller.

All the Globe's losses in the great Chicago fire have been paid in full. The State auditor has issued his certificate of authority and qualification to do business, and the directors, as an earnest of their purpose to make the Globe a first-class company, have resolved to double the present cash capital.

—THE Missouri superintendent of insurance, in his late report says, concerning the defunct Atlas Life: "The examination of the Atlas disclosed the fact that the company had been nearly, if not quite, insolvent more than a year ago, and that the impairment existing at the time of the department examination made February, 1871, was covered by money borrowed temporarily."

The company's statement for January 1st, comprised assets \$586,930.17, liabilities \$543,707.81, showing an impairment of reserve amounting to \$43,222.36. Department then demanded explanation of certain items, when a statement was furnished for February 24th, showing assets \$484,750.64, liabilities \$578,767.62—reserve impairment \$94,016.98. Then the superintendent made an examination at the request of the directors, which resulted in an exhibit for March 1, of assets \$476,378.32, liabilities \$655,228.32—impairment \$148,850.

—THE new firm of Whitman, Nelson & Co. are about established in their new quarters on the south side of Chicago. This firm, who are the sole city agents of the reorganized Globe, of Chicago, is composed of well-known, active business men. Mr. Whitman has had seven years experience in fire underwriting, and it was largely through his efforts and influence that the Globe was placed upon its present footing. Mr. Nelson, of late years successfully engaged in the real estate business, was at one time agent for several insurance companies in Michigan, and his record is that he "did well for them." Our advices from Chicago assure us that the firm will do a good as well as large business.

—MESSRS. CHEPPU & BUCHER succeed the late New York agency and brokerage firm of Cheppu & Brown.—Expert in all the details of their business, energetic, prompt, and enterprising, their is no reason why Cheppu & Bucher should not push things lively, go ahead and keep ahead. They represent three fire companies, viz.: the American Central, of St. Louis, the Farmers' Mutual, of York, Pa., and the Lancaster, of Pennsylvania, having an asset total of one million and three-quarters.

—E. W. BRYANT, actuary of the New York department under the Miller regime, has been appointed actuary of the Life Association of America. Bryant was one of the valuers at the late examination of the Association.

This appointment frees Mr. Hanley from the double duty of secretary and actuary, enabling him to devote his entire time to the practical work of the secretaryship. Mr. Hanley is an expert in the whole official life insurance programme, and his system for expediting policy valuations is highly commended.

—THE Missouri insurance superintendent hopes the Protection Life Insurance Company of Chicago will make no further application for admission into that State until its assets are in proper shape, and its officers willing to answer proper questions as to its affairs and conditions.

The National Life, of Chicago, being refused admittance to Michigan, applied to the Supreme court for a mandamus to compel the State commissioner to issue the necessary permit. Writ refused.

—UNPAID stock subscriptions, even when not assessable in the company's contract, are a troublesome legal liability when the company is short of means to meet its debts. Stockholders of the late Great Western Fire Insurance Company of Chicago are just now exceedingly nervous over a decree of the District court of northern Illinois, ordering the amount of unassessable unpaid stock to be paid to the assignee of the company by the 15th of August.

—THE active general agency firm of E. E. Ryan & Co., of Chicago, have issued a pocket pamphlet copy of the Chicago fire ordinances, with their elaborate building, manufacturing, and storage precautions against fire. The mayor and municipal boards acknowledge, with their approval, the furnishing of 20,000 copies by Messrs. R. & Co. for gratuitous distribution.

MESSRS. H. S. TIFFANY & Co., Chicago, general managers of the lake department of the North Missouri Insurance Company, received in the last five months for the North Missouri \$80,000 of premiums, and what is more remarkable in these times, there is a small per centage of loss to charge against this sum of premium.

—THE official report of the October meeting of the National Insurance Convention is before the public: compiled by Olcott, secretary; printed by the Goodells. It is a bulky volume, and a considerable portion of the contents is worthy of preservation.

—ROBERT A. GRANNISS, once secretary of the Widows and Orphans' Benefit Life, has been appointed secretary of the Metropolitan Life, and the Metropolitan could not have got a better man for the position.

—A TONTINE endowment plan, based upon the stock system of life insurance, is the subject of a pamphlet from the fertile pen and clear practical brain of Secretary John F. Collins, of the Republic Life. We shall take early occasion to present our views on this plan.

—GEORGE W. SARGENT, Esq., deputy insurance commissioner of Massachusetts, died July 3d—a good man, a trustworthy official. His successor is Stephen H. Rhodes, Esq.

—THE latest report concerning the Hercules Life Insurance Company of New York is that its risks will be reinsured in the Life Association of America.

—WE hear of two or three new life companies starting. Two years hence will be time enough for such experiments.

RAILWAYS AND TRANSPORTATION.

FROM accounts that have from time to time been published of the movements and speeches of the new president, the engineer, and a party of directors of the Texas Pacific railroad, who have been exploring that part of Texas and adjoining States through which the new Pacific road is to run, we get a much better idea of the proposed road, its cost, and the features of the country through which it will pass, than from any accounts heretofore given. The party met at Shreveport, on the 20th of June last, the board of trade of that city, and Col. Scott, after urging upon them the importance of the new railroad, asked that the city of Shreveport purchase and donate to the company all the property lying between Commerce street and the Red river, commencing at the line of Cotton street, and extending to the Silver Lake tract, and protect the river embankment by suitable works, &c., so as to make the location a safe and suitable one for the permanent depot of the company; and also grant a right of way for the road, and the running of cars from their present terminus down Cotton street to Commerce street and the Silver Lake tract, with full power to use the same as would seem most advantageous to the company. The propriety of this request of the president was acceded to, and a resolution immediately passed the board of trade, urging upon the city authorities the necessity of immediately taking steps to put the title to the property and franchise asked by the railroad company in it. The road as located will have two eastern termini, at Shreveport and Texarcana, from which points it will proceed in a westerly direction, uniting the two branches at Fort Worth, in Tarrant county, Texas, from which place it will proceed westerly through Indian territory and Arizona to San Diego, California.

The engineer, Gen. Dodge, is already locating the line and letting contracts, and it was promised by Col. Scott, that within two years there should be at least five hundred miles of the road finished, if he had a reasonable amount of support and assistance from the inhabitants of Texas. This was promised, and the whole Red River region seems to have become awakened to the necessity of going to work in earnest. At Fort Worth, the assurance was given that the town would donate the quantity of land required, in a favorable location (about three hundred and twenty acres), for depots, &c., and other material aid was promised.

The party, after visiting most of the counties through which the proposed road is to pass, and in each receiving assurances of immediate material aid, returned to New Orleans, where, on the 4th of July, the most important railroad meeting of the whole was held.

It appears that outlets are proposed for the road at St. Louis, Memphis, Vicksburg, New Orleans, and any other points that will build a road to connect with the Texas Pacific. The importance of immediately taking steps for the construction of a road from New Orleans to Shreveport, was especially urged upon the chamber of commerce of the former city; such a road would cost about ten millions of dollars, and it will be necessary for New Orleans to raise about one-fifth of that sum. The advantages of the proposed railroad were, however, urged with so much force, that before the meeting adjourned, a committee of fifty business men was appointed to confer with the directors of the Texas Pacific, as to the best means of immediately putting the project in a tangible shape, and from the spirit shown the road will undoubtedly be soon constructed. It was also urged upon the meeting, the necessity of connecting New Orleans with southern Texas by two lines of railway, one to Houston and one to Galveston, and although there were no immediate step

taken, still the proposed connection is a vital necessity; and as there is no probability of New Orleans being allowed to relapse into the lethargy in which she has so long been engulfed, these roads will undoubtedly be constructed before many years. Col. Scott promised the people of New Orleans a ride from their own city to San Diego within six years, and he undoubtedly intends to keep his promise; and although all the rose-colored visions of enthusiastic minds in regard to this road cannot possibly be realized, still its construction is assured, and it is the thing needful for that part of the United States lying southwest of the Mississippi, and its effects will be felt in Mexico as well.

—ANOTHER railway scheme, having for its object a grand trunk road between Council Bluffs and New York, has been projected, and seems in a fair way of completion. On the 15th of June last, articles of consolidation between the New York Western Railway Company, a corporation organized and empowered to build a railroad from Council Bluffs through the States of Iowa, Illinois, Indiana, and Ohio, and the Continental Improvement Company, of Pennsylvania, were filed with the secretary of state, at Indianapolis. The new company is to be known as the Continental Railway Company. The capital stock is to be \$100,000,000, divided into 1,000,000 shares. The headquarters of the road are, of course, to be in New York; though its affairs are to be managed by a board of eighteen directors, two of whom may reside in Iowa, two in Illinois, one in Indiana, two each in Ohio and Pennsylvania, and the remainder wherever the board may designate. The consolidated companies are each to maintain their local organization, with an office in each respective State, and the presidents of the local organization shall be a vice-president of the company. These local organizations are to be subordinate to the central head, and are expected to carry out the contracts for building, &c., made by the central authority.

In addition to the central and local organizations, it is to have an advisory board in London, which is to rejoice in the name of the London Board of the Continental Railway, and to have the right to have a local agent in America.

This machinery seems complicated, and doubtless some of it will be practically useless, especially after the road is in operation, but we suppose much of it was rendered necessary by the mode of organization; that is, under State charters, instead of congressional authority covering the whole line. The company has done well in thus going to the States for the necessary authority to construct the road. The people are growing suspicious, and we think with reason, at the tendencies of congress to usurp the control of our railway system, and that the railway legislation of the several States is sufficiently broad to cover any responsible railroad scheme, the organization of this company abundantly demonstrates. The rapid growth of the West renders the proposed road a necessity, and although the only man of prominence which we see in its board of directors is that of Edward Dodge, of the firm of Jay Cook & Co., still other prominent railroad men will take it up, and its construction is beyond a possibility.

—THE narrow-gauge convention held in St. Louis on the 19th and 20th of June, at the close of their session had an elaborate report on narrow-gauge roads read to them, and then referred it back to the committee for revision and publication. The report is extremely lengthy, and as usual, so entirely taken up with the advantages of the narrow-gauge system, that its comparisons between that gauge and the usual one of 4 feet 8½ inches, are very unfair. For instance, the statement is made that the comparative cost of the narrow gauge over the old system, in rough and mountainous countries, will not be over one-fifth of such roads as the Erie, Pennsylvania, and Baltimore and Ohio roads; in broken and rolling country one-half, and in slightly undulated prairie or plains, three-fifths. Nobody will deny these statements, but the committee is very careful not to state what would be the cost of an ordinary gauge road which would supply exactly the same facilities for traffic as the narrow gauge. The committee has given considerable space in their report to an elaborate comparison of the weight of rolling stock on the two systems, and as usual, points triumphantly to the result as greatly in favor of narrow-gauge roads; how unfair its conclusions are, may be inferred from a single example. It compares Mr. Farlie's narrow-gauge cotton car, said to weigh 3000 lbs., and be capable of carrying 10,800 lbs. of cotton, with an ordinary freight car which weighs about four tons, and whose average load is ten tons. Farlie's cotton car is simply a four-wheeled platform truck, only intended for some such freight as cotton or hay. The only true com-

parison, of course, will be to compare cars of the same class and build, and that a narrow-gauge box car, having eight wheels, will carry more merchandise in proportion to its weight, than one of the same kind on the ordinary gauge, we do not believe.

After a careful examination of all the advocates of the narrow gauge have to say, we come to the same conclusion we did some months ago, namely, that while many ordinary gauge roads do not pay, it is only because this road as built is larger than is needed, but that the attempt to replace any of the main trunk lines by cheap narrow-gauge roads, would be a failure, from the inability of the cheaper road to do the business.

—THE report of the Chicago, Rock Island, and Pacific Railroad Company, for the year ending March 31, 1872, has been published, and from it we gather the following summary:—

Gross receipts from all sources, (earnings of road, and int. on loans, premiums, &c.)	\$6,121,797 99
Total operating expenses, including taxes and legal expenses.....	2,950,262 86
Net earnings.....	\$3,171,535 13
From this sum there has been paid dividends, April and October....	\$1,439,708 00
Interest on bonded debt.....	609,175 00
Rent of Peoria and Bureau Valley railroad.....	125,000 00
	<hr/>
	\$2,173,883 00
Leaving a surplus of.....	\$ 997,652 13
Add balance of income account, March 31, 1871.....	2,719,377 89
Total.....	<hr/>
	\$3,717,030 02

While the gross earning of the road have decreased, as compared with the amount for 1871, two per cent., the operating expenses have also decreased about thirteen per cent., leaving an increase in the net earnings for the present year of \$327,659.83. The managers attribute the decrease in earnings mainly to the Chicago fire and the snow blockade of the Union Pacific railroad. The amount charged to construction and equipment account is very large, being \$2,054,310.31—the three largest items being new equipment, \$863,943.74; Indianola and Winterset railroads, \$352,461.33; and the Sigourney railroad, \$501,901.17. These are, however, permanent improvements, and will doubtless be a good investment. The company lost at the Chicago fire over insurance, \$254,560.40, besides \$106,500 invested in the Pacific hotel, a part of which they hope to save. The year, on the whole, seems to have proved a profitable one to this company. The most gratifying part of this exhibit to every one who desires that railroads increase in real usefulness, is the low ratio of running expenses, taxes, &c., to income—about fifty per cent.

—SATISFACTORY progress is reported in the construction of the international bridge from Black Rock to Fort Erie. There are to be eight piers in the main stream, three of which, as our readers will doubtless recollect, were sunk in 1871. The bridge on the American side, across Black Rock harbor to Squaw island, is already virtually completed, the length of this section being about six hundred feet. Several hundred men are now at work at this bridge, and as, in addition to the work here stated, the permanent stone pier on the west side of Squaw island is completed, and the piles are being driven for the eighth pier, in the Canadian channel. The early completion of the work is expected. In one respect this bridge will be a singular structure, in being built upon an easy curve to the north. This was rendered necessary by the fact that a straight bridge would have carried the approaches through a valuable property, making it too expensive.

—THE annual report of the Toledo, Wabash and Western railway shows that the company owns 605 $\frac{1}{8}$ miles, and leases 328 $\frac{1}{8}$ miles of railroad. The capital stock and bonded debt is \$33,700,000, equivalent to \$55,610 per mile, the bonded debt alone being \$29,208 per mile. The gross earnings of the road, (leased lines not included,) was \$5,736,665.91; the running expenses, including taxes, etc., were (66 per cent.) \$3,776,827.93; balance, \$1,959,837.98, from which take the total interest on bonded debt and preferred stock, \$1,359,120, leaving a net balance of \$609,717.98; the increase in gross earnings over previous year is \$1,192,924.99, or 26 $\frac{1}{4}$ per cent. The directors concluded to pass the dividend (as usual), and devote the above net balance to the permanent improvement of the road and rolling stock.

—AFTER some weeks of exciting rumors in regard to the future control of the Erie railway, in which the name of almost every prominent railroad man in the United States was in turn brought forward and confidently announced as the coming man, even that of Com. Vanderbilt, the stockholders of that corporation, on the 9th of July, met and held a quiet election, resulting in the choice of the following directors: Gen. John A. Dix, J. S. D. Babcock, John J. Cisco, ex-Gov. E. D. Morgan, J. T. Johnston, F. Schuschart, Gen. Diven, W. B. Duncan, W. R. Travers, S. L. M. Barlow, Chas. Day, W. W. Shippen, H. L. Lansing, H. Ramsdell, G. T. Oliphant, J. V. L. Pruyn, and P. H. Watson. This ticket was a compromise between opposing factions, and was elected by a majority of the whole stock, about 70,000 American, and 450,000 foreign votes were reported, representing about \$60,000,000 of stock, of which amount Messrs. Barlow, Homans, and McHenry reported about \$45,000,000. This board of directors subsequently elected Mr. P. H. Watson president, and Gen. Diven vice-president. The financial statement of the road shows the earnings for seven months to be unprecedentedly large, \$10,374,599.50, an increase over the like period of last year of nearly 15 per cent., while the expenses are decreased a little more than two per cent. With this board we regard the future of Erie as hopeful, but from its enormous capital stock no dividends can be anticipated except upon a small portion, unless its receipts are increased much more than can be expected.

—ESTIMATES called for to build an iron or suspension bridge across the Chemung river, at Elmira, N. Y., showed all sorts of prices, not only the terms for a bridge which would probably fall of its own weight, but different judgments as to what really constitutes safe and durable bridge-building. The competent engineers of the Continental Bridge Company, of Philadelphia, offered to build the superstructure with wooden floor-beams for \$63,300, or with iron floor-beams for \$74,500. We presume that in these occasions there is a wide margin in price, according as to whether the limited ideas of the projectors are carried out or sound engineering principles rule.

—THE people of St. Louis and San Francisco are making energetic movements to insure the immediate construction of their new connecting railroad, 2,400 miles in length. A committee of business men from San Francisco have lately visited St. Louis, and their visit has had the effect of intensifying the enthusiasm of the people of both cities. The report of the committee, it is thought, will insure subscriptions from San Francisco alone of quite \$10,000,000, and perhaps as much more from other parts of the State. St. Louis papers speak of the construction of the road as a foregone conclusion.

—A COMPILATION of the monthly reports of twenty-three principal railroads of the United States, shows an increase in traffic and earnings, without any corresponding increase in expenditure, for the first five months of 1872, over the corresponding period of last year, of about 16 per cent. No better illustration could be had of the prosperity of the railway interests, but as there has been a steady increase for several years, the question intrudes as to when we shall reach the highest quotations.

—DURING the month of June, 1872, the earnings of the St. Louis and Iron Mountain railroad show an increase over the corresponding period of last year, of over 57 per cent., and the increase for the six months of 1872, are quite 40 per cent. greater than last year. Neither of these roads, however, shows quite so great an increase as the St. Louis, Kansas City, and Northern railway, the receipts of which for the first week in July, show an increase of 100 per cent. over the corresponding period of 1871.

—THE Peninsular railroad, of Michigan, which has been tottering for some time, seems in a worse way than ever, financially, for now comes the report that an association for the protection of the interests of the bondholders, has been formed in Amsterdam, Holland, to act in common towards this delinquent company, and if necessary send the bonds to this country for foreclosure of mortgage.

—THE earnings of the Central Pacific for the month of June, 1872, show an increase of \$426,964 over the corresponding month of last year, an increase of 53 per cent., and the earnings for the six months ending July 1, 1872, show an increase over the corresponding period of last year of \$1,547,601, or 38 per cent.

PATENTS, ARTS, AND SCIENCE.

[This Department is under the editorial charge of C. ELTON BUCK, Analytical and Consulting Chemist, Wilmington, Delaware.]

A RESUMÉ of the history and properties of paraffine by our friend, Prof. Charles A. Joy, appears in a recent number of the Journal of Applied Chemistry. This remarkable substance was discovered in 1830, by Baron Von Reichenbach, among the products of the destructive distillation of wood. Owing to its permanency, and to the weakness of its affinities—which prevent its entering into combination with any other bodies—he called it paraffine, from two Latin words, *parum affinis*. It has since that time been largely prepared from many substances of organic origin, such as lignite, bituminous, and cannel coals, as well as peat, ozokerite, petroleum, and other substances. In petroleum, ozokerite, bitumen, and a few similar bodies, paraffine exists as a consistent part, while in the other substances above named, it is a product of distinctive distillation. The great importance and the varied uses of this hydrocarbon have caused much attention to be paid to its manufacture, and it is now prepared in large quantities. Its appearance is well known. It is a white, waxy body, inodorous and tasteless, with a degree of hardness intermediate between wax and tallow.

The manufacture of paraffine from ozokerite is now conducted on a scale of great magnitude. This material is a vegetable wax of yellowish color, fibrous structure, and light specific gravity. It melts at a low temperature, but will not burn without the intervention of a wick. On fractional distillation it yields sixty per cent. of paraffine and eight per cent. of oil. It is found in Austria, Moldavia, the Caucasus, and near the Caspian sea. The chief use of the refined paraffine is for the manufacture of candles, of which immense numbers are produced—single establishments in Germany turning out 250,000 per day, while there are factories in England where this quantity is exceeded. From its cleanliness and purity, its freedom from a greasy touch, paraffine is susceptible of a variety of uses. As it is insoluble in water, and indifferent to the most powerful acids, alkalis, and chlorine, it is an important adjunct in the laboratory. For stoppers to acid bottles, for coating paper for photographic and other uses, for coating pills, for the preservation of railroad and other timber, for coating wine and beer casks to prevent leakage, tipping parlor matches, rendering drawing paper transparent, as an insulator for telegraph wires, as a preservative of meat, flowers, and fruit, paraffine has many and varied applications, and it is probable that it will be employed in many other directions than those hitherto indicated. The applications it has already received, and the magnitude of the business in preparing it, afford striking evidence of the progress of chemical technology, as sixteen years ago paraffine was a substance almost unknown, except to chemists.

—PROF. CHARLES A. SEELEY has patented an improved process for extracting the useful substances from hops, and for manufacturing a pure, concentrated extract of hops, which is worthy of note and description. The invention is based upon the discovery that the ordinary petroleum oils are rapid and complete solvents of the essential oils and of the bitter matter of hops. At the same time they have no solvent action on the other constituents of the plant, which in practical operations are either useless or hurtful. The improved process consists in steeping the hops in petroleum oil, and then by heat, stirring, digestion, and percolation, promoting the solvent

action of the oil. When the extractable matter of the hops has thus been dissolved, the solution of hop extract in oil is separated by filtration from the refuse matter, and the solvent is volatilized or distilled off by heat, the extract thus obtained being free from the solvent and other foreign matter. The kinds of petroleum oil proper for this purpose are naphtha and gasoline, which are higher parts of Pennsylvania petroleum. Although any petroleum oil which has a boiling point below 212° Fahrenheit may be used, a gasoline which boils at about 100° Fahrenheit is preferable, because at that temperature the essential oil of hops will not escape from the extract solution when distilling the solvent. The apparatus employed in manufacturing the solution and distilling the solvent is such as is suitable and well-known for use when bi-sulphide of carbon, ether, hydrocarbons, or alcohol are used for analogous purposes. The extract of hops thus described is of a pasty consistency, more or less thin in proportion to the quantity of essential oil contained in it. It is slowly and sparingly soluble in water. In order to increase its solubility, and to give it a more convenient consistency for measuring and transferring, sufficient alcohol is added to give it the consistency of a thin syrup. This is probably the best form for a commercial extract of hops. This extract differs in some important respects from the hop extracts hitherto known, and is therefore a new commercial product. It contains all the matter of the hop plant which it is desirable to use in the preparation of beer, while the saline and albumenoid substances found in alcoholic and aqueous extracts are wholly absent from it. The extract in its simple form is solid when cold, pasty when warm, and quite fluid at the boiling point of water.

—In the previous issue of this Review, the increased use and application of paper was referred to, and we notice in this department this month another instance of its extending utilization. As a substitute for iron in making armor plating for ships, paper was suggested a number of years ago, and in 1860 Signor Muratori, a colonel in the Italian army, commenced investigations and experiments upon the subject, which he has vigorously prosecuted in the interim. In 1862 the attention of Victor Emanuel was drawn to the result of his experiments, and which had obtained the approval of the officers of the Italian army. About the same time Gen. Griffini published a pamphlet in which he expressed his favorable opinion of Col. Muratori's invention, and recorded all the results of the trials which had been officially conducted, and which satisfactorily proved the great power of resistance which the material offered. In 1868 the matter was submitted to the notice of the emperor, Napoleon, who caused experiments to be conducted at Chalons, the results of which confirmed the earlier official trials made in Italy. The French report speaks in very sanguine terms of the invention, and indicates the manner in which it could be utilized for the protection of vessels. After some delay, further trials were commenced, but before any action was taken, war with Germany was declared, and the matter was temporarily deferred. Col. Muratori is now in England, making arrangements for a thorough trial of paper armor, with satisfactory effects. Engineering says that one successful application has been already made by the inventor, in the construction of cuirasses, which, while they weigh as much as the ordinary service cuirasses, and cost less than one-fifth as much, have a far greater power of resistance. A regulation pistol bullet, fired from a distance of three feet, has been turned by a paper cuirass, which is equally capable of resisting a bayonet thrust. By a modification of the process, fabrics suitable for military gaiters are made, with a great power of resistance. Its success with small arms, and the great strength and lightness of this paper armor, indicate that it may be applied instead of iron and steel to the plating of ships, and it is probable that such armor plating may be serviceable in protecting the bottoms of vessels from the explosions of torpedoes.

—AMONG patented improvements in the arts, a new process of frescoing in oils, invented by Charles S. Kemmer, of Newark, N.J., seems likely to take precedence over all other kinds of wall decorations. In the application of this process, ordinary sheeting is dipped in soap and water and stretched on an ordinary frame. It is subsequently covered with a coating of gelatinous size, and allowed to dry. An oil painting is then executed on the prepared sheet, and after it is thoroughly dried, the gelatinous sizing between it and the sheeting is moistened, and the painting bodily removed from the sheeting. The painting is then attached to the plaster by a strong liquid cement. In preparing the painting, about five coats of the best linseed oil fresco paint are used. This pro-

duces a tough, tangible film, about the thickness of ordinary writing paper, which will bear washing with soap and water as often as desired. When cemented to the plaster it adheres with great tenacity, and possesses the decided advantage over ordinary frescoes, that the paint will not peel off. Moreover, cracks which may appear in the wall, unless of large size, do not affect the film. In the manufacture of this portable fresco, plain and other tints are turned out in pieces twenty inches wide and eight yards long, ready for attachment to the plaster. Where a ceiling or wall is to be covered with a decoration specially designed for the purpose, and complete in itself, the painting is executed of the size required, and the film is cut into strips of a convenient size for cementing to the plaster, which match as accurately as strips of printed wall paper. The great advantage claimed for this process is the rapidity with which the work may be done. The film, when once finished, may be applied in one day, whereas three weeks would be required to fresco in oil in the ordinary manner.

—A MILL has been devised in England to overcome the difficulty of reducing soft and sticky substances to powder. The principle of this machine may be described as follows: A lump of sticky material, thrown into the air, and struck with a stick, will fly to pieces; so the inventor constructs cylindrical iron cages, with sticks or beaters whirling round therein, and with a contrivance for driving through the material to be crushed, in such a way that the lumps are struck by the sticks and reduced to any required degree of smallness, or even to powder. The flying lumps offer but very little resistance, consequently there is but little friction, and the power of the beaters is not impeded as it would be by the passing through a mass of lumps at rest. And thus it is found in practice, that clays, ores, and other minerals can be granulated or pulverized at pleasure. The adaptation of the machine to a flour-mill is the special importance. Grains of wheat are struck by the beaters, driven round at a speed of about 400 revolutions a minute, instantaneously reducing them to meal, and as the bran is beaten off the grains in comparatively large flakes, there is a more perfect separation of bran from flour than in that ground by mill-stones. The flour is delivered in a finely granular condition, whereby it absorbs more water when used. Bread made from this flour is lighter and will keep better than ordinary bread. Two such mills of this construction have been in work at Edinburgh more than a year. Each one disintegrates twenty quarters, or 160 bushels of wheat an hour; as much as could be produced by twenty-seven pairs of ordinary mill-stones in full work. And in actual practice, the difference in value on sixty-eight sacks of flour is $5\frac{1}{4}$ per cent. in favor of the new mill, which, at the rate of twenty quarters an hour, would produce a large sum during the year.

—ABIETINE is the name of a new hydrocarbon discovered by Dr. Wenzell, of California. It is a distillation of the resin exuding from the *pinus sabiniana* of the Sierra Nevada and the coast range. The properties of this new body distinguish it from spirits of turpentine and other hydrocarbons. Its specific gravity and boiling-point are both low. It dissolves the fixed oils freely; with the single exception of castor oil, upon which it has no action. Balsam of copaiba is freely soluble in it in all proportions. When burned in an alcohol lamp with a flame of moderate size, it produces a clear white light, free from smoke. The vapor of this substance is said to possess decided anæsthetic properties, while at the same time it is a deadly enemy to moths and other noxious insects.

—THE epilobium, or fireweed, a species of cotton-plant, springs up spontaneously on ever-green lands that have been burnt over. It is perennial, grows to the height of four to six feet, the stem being one-fourth of an inch in diameter, and about two feet from the top, putting out a dozen to twenty branches, each bearing from fifteen to twenty pods, that in August open and display a white fibre like that in the boll of the cotton plant. The seeds are very small and numerous, but do not require ginning to separate them from the fibre. The plants grow close together on poor or rich soil, and in any climate from forty degrees north to the Arctic circle. Its southern limit of growth is the northern limit of cotton, and is very similar to cotton. Candle and lamp wicks have been made of it, and ropes that proved as strong as cotton ropes of the same size. Carded and spun, it makes an excellent yarn, from which stockings have been made. Its fibre produces the finest paper, being almost equal to silk for this purpose.

—CHLOROFORM, when used to induce the state of anæsthesia, is sometimes attended with dangerous and even fatal consequences. In order to diminish the liability to accident, M. Bernard, of the College of France, has studied the comparative physiological action of the different alkaloids of opium, and has shown that by combining morphia and chloroform a very complete anæsthesia may be produced with a much less quantity of chloroform than when that liquid is used alone. To demonstrate this, Bernard injected five to ten centigrammes of muriate of morphia under the skin of a dog, and shortly afterwards administered chloroform. Every time the experiment was tried, the anæsthesia was produced at once, and continued some time, although the quantity of chloroform administered was very small. Experiments on human patients by surgeons in Munich and Strasbourg, produced substantially the same results, and based on the labors of these physicians, the following conclusions are announced:—

That anæsthesia can be produced more rapidly on man, and also on animals, by the combined action of chloroform and morphia than when chloroform is used alone. That this anæsthesia lasts longer and can be prolonged by very feeble doses of chloroform, and on that account the risk of fatal accidents will be very considerably diminished: and that the dose of muriate of morphia previously injected could be increased without inconvenience, and perhaps it would be an advantage to inject it a little longer time before the operation, as it is believed it is not all absorbed at the time of the operation.

—SAFETY matches, as is well known, are sometimes made so that they will not ignite unless rubbed on a specially prepared surface. Prof. Hlasiwetz, of Sweden, has recently published analyses of the tips and prepared surface for matches made in that country, which reveal the following composition:—

	Match Tips.	Prepared Surface.
Powdered glass.....	8.77	....
Glue.....	7.12	3.65
Neutral chromate of potassa.....	7.36	....
Chlorate of potassa.....	46.76	....
Hydrated oxide of iron.....	5.39	3.19
Binoxide of manganese.....	13.07	13.06
Sulphur.....	7.41	....
Hygroscopic water.....	4.22	....
Ter-sulphide of antimony.....	....	50.34
Amorphous phosphorus.....	....	29.91
	100.00	100.15

—TOBACCO users receive another warning concerning the pernicious influence of the weed from M. Farnisier, of Paris, who states that out of fifty-nine grave affections of the nerve centres observed among men from 1860 to 1869, forty occurred in smokers. In fifteen cases of hemiplegia, nine abused tobacco, two used it moderately, and four did not smoke. Of eighteen cases of paraplegia, five were great smokers, three moderate smokers, and ten abstained from tobacco. Out of sixteen cases of locomotor ataxia, ten were great smokers, five moderate, and one abstained. Farnisier thinks that it is especially, if not wholly, to this cause that we must attribute the disease in the majority of cases of hemiplegia and of ataxia he has noticed since 1860. M. Lefevre, of Louvain, thinks it indubitable that excessive smoking causes paralytic mania; because, first, nicotine causes in animals progressive enfeeblement of the muscles of motion up to paralysis, and congestion of the nerve centres; second, that analogous symptoms have been noticed in numbers of persons who abuse tobacco in smoking and chewing; and third, that it has been found in all countries that there is a constant relation between the consumption of tobacco and the increase of general paralysis.

—THE Belgian government some time ago appointed a commission to inquire into the sanitary relations of factories where chemicals are made. In their report the commission places alkali works among the most noxious of all. They also condemn tall chimneys as being more hurtful than short ones, in consequence of the greater surface over which they diffuse deleterious gases and vapors, as well as for the reason that by increasing the draught, tall chimneys discharge gases into the air, which would be otherwise absorbed in the passage.

—PETROLEUM occurs in the republic of Santo Domingo, about three miles north of the town of Azua, on a stream called "el agua hediondo" or stinking water, deriving its name from the well-known odor of the crude oil and gases which bubble up to the surface. According to Prof. W. M. Gabb, the spring makes its appearance as a stagnant, torpid pool, exuding slowly through a heavy gravel deposit. A very small area in the vicinity is covered by deposits of pitch, while for half a mile down the now dry bed of a rain-water stream, the gravel and sand is more or less cemented together by an impure pitch, sometimes plastic, oftener hardened to asphaltum. The pools of the spring and neighboring excavations contain a dirty water rendered brown by contact with the oil, and on the surface is a thin pellicle of liquid petroleum, dark brownish-green to reflected light, and a reddish-brown by transmitted light. The odor of the oil on being rubbed on the hand is fetid. In 1865 and 1866 attempts were made to bore for oil at this spot, and the ruins of the engine and boring-tools lie scattered about. The enterprise was not successful—probably owing to a want of perseverance and capital as much as to any other reason.

—BRICKS are now made in South Staffordshire, England, from the refuse shale of the coal mines, which has hitherto accumulated in such immense piles at the mouths of the pits. Experiments have been made from time to time, with a view to the utilization of this refuse, and recently several firms have embarked in the business of making bricks, which are said to give great satisfaction to consumers. When properly pulverized, the shale is found to be an excellent material for the purpose, the bricks being hard and durable, resembling in color the celebrated Stourbridge fire-bricks, although, of course, for furnace purposes they will not answer. For ordinary building they are quite as valuable as the common red bricks differing somewhat in color, which is objected to in a smoky district like South Staffordshire. It is believed that this method of utilizing the immense piles of refuse shale in the coal region will develop into an industry of some importance. The material is valued at merely a nominal sum, and exists in almost inexhaustible quantities.

—AMONG new chemical processes invented within a short time, is that used at the Widnes alkali works, in England, in which chlorine is manufactured without the use of the binocide of manganese—the latter substance being wholly dispensed with. The decomposition of the hydrochloric acid is accomplished by a mass of broken bricks previously soaked in a solution of blue vitriol and dried. Through this mass, heated to a temperature of 700° Fahrenheit, a mixture of the acid vapor and air is passed. An almost thorough decomposition of the acid vapor takes place, while at the same time it is stated that at the end of the operation the copper salt is found to be unchanged. This process has not yet been adopted on any very large scale, but the experiments made with it have led to high anticipations of its success. It was supposed at first that difficulty would be encountered owing to the dilution of the chlorine; but in practice this has been found not to interfere with the employment of the gas in the manufacture of bleaching powder or of chlorate of potassa.

—ACCORDING to *Poggendorf's Annalen*, a new and powerful thermo-electric battery has been invented by Noë, of Vienna, in which the negative metal is an alloy of secret composition, resembling German silver, in the form of a wire. The positive metal is also a secret alloy cast in cylinders around the wire. The wire is protected from the flame by a copper cylinder, insulated from the positive metal by a piece of mica. It is said that one of these elements equals in electropower, 1.24 to 1.36 Jacobi-Siemens's units. Therefore nine to ten of Noë's elements are equal to one Daniell cell, and twenty-one of Bunsen's. A battery of seventy-two elements, when arranged for intensity, decomposes sea-water with rapidity. In two series of thirty-six it puts a moderate size Ruhmkorff coil in complete action, and in four series of eighteen it produces powerful electromagnets.

—ANIMAL charcoal has been pronounced by Drs. Eulenberg and Wohl to be a superior antidote to the poisonous effects of phosphorus. A number of experiments have warranted the belief that it is far more efficacious than the oil of turpentine, which, although valuable for the purpose, frequently produces headaches of great severity. The bone-black is administered in the form of pills made with gum tragacanth or other mucilaginous substance.

—SINCE the advent of Phillips's fire annihilator and other contrivances of a similar kind, a number of patents have been taken out for prompt and ready methods of extinguishing fires before any considerable headway has been attained by the flames. These inventions chiefly rely upon a supply of carbonic acid, either in its gaseous form, or as an aqueous solution. A recent English invention in this line is spoken of as being devised upon an entirely new principle. The water in the machine is charged with carbonic acid and nitrogen, prepared by drawing atmospheric air through a charcoal fire, and forcing it into a tank containing water. It is claimed that one cubic foot of this solution of mixed gases, discharged upon any burning body, is capable of doing as much execution in extinguishing a conflagration as fifty cubic feet of water from an ordinary fire engine, and in one-twentieth the time.

—SOAPSTONE has recently found a new application as a raw material for buttons, dominoes, and other similar objects. Chips and refuse pieces of the mineral are ground to powder, mixed with silicate of soda—water-glass—and after a repose of some hours, drying on a plate, when the mixture is again pulverized. The powder is then subjected to powerful pressure in moulds, and afterwards baked in air-tight fire-clay crucibles. The pressed objects are a second time saturated with water-glass, and again heated out of contact of the air. The hardness of the product depends, in a great measure, upon the number of times the heating is repeated. The last stage of the process of manufacture consists in washing in water in a rotary tub, drying and agitating in a suitable vessel with soapstone powder, which imparts a polish to the surface.

—TELESCOPES of large size are now much more frequently made than formerly. The largest refracting telescope in the United States is now being made at Cambridgeport, Mass., for the naval observatory, at Washington. It has an object glass twenty inches in diameter, being eleven inches larger than the one at Harvard college, and when finished it will be worth \$23,000. The two glasses weighed in the rough, two hundred and fifty pounds, and cost \$7,000. They were made in Birmingham, England, and were imported six months ago, since which time they have been undergoing a polishing process. More than fifty pounds have been cut from the flint glass, which now weighs one hundred and ten pounds; and the other, when finished, will weigh about seventy-five pounds. The total cost of the instrument will be \$46,000.

—A NEW system of telegraphic communication, by means of a tube filled with water, has been invented in France, by M. Tommasi. This tube is made of copper, one-sixteenth of an inch in diameter. A length of 3,280 feet is to be used for the experiment, and it is hoped by the inventor that he will obtain several advantages. First, a speed of transmission of at least 600 signals per minute, even through a length of 1,000 miles; second, the ability to signal through the same tube both ways at once; third, the facility for printing despatches; and fourth, a very small cost of construction. The thread of water in the tube is in communication at each end with two pistons of the same diameter. One of these pistons is slightly pressed, and the motion is immediately transferred to the other piston. The tube and its pistons are in connection with an electro-magnetic apparatus to facilitate the transmission and reception of messages.

—SULPHURETTED hydrogen is proposed as a blowpipe reagent by Mr. Landauer, who has communicated a paper to the Chemical Society of Berlin, in which he states that the reactions ordinarily obtained by the gas in the humid way, may be obtained by mixing the metallic compound to be tested with hyposulphite of soda upon borax, and exposure to the reducing flame. In the case of volatile compounds—such as salts of mercury and arsenic—Mr. Landauer advises that the mixture be heated in small glass tubes. The characteristic smell of sulphuretted hydrogen which is evolved, shows the extent of the reaction, and the sulphide colorations are plainly visible. It is advised to free the hyposulphite of soda entirely from water before use.

—THAT wood preservatives may sometimes do much harm, has been proved by the experience of workmen engaged in building a depot of the St. Louis, Vandalia and Terre Haute Railroad Company, in east St. Louis. The timber used in the construction of the depot was saturated with arsenic and other poisonous preparations to preserve it from decay. Five or six workmen have died from the effects of the absorption of the poison into their systems, and a number of others have been physically ruined for life. A suit has been brought against the company by one of these mechanics, in which the damages are laid at \$25,000, and eleven other workmen have commenced similar proceedings at Bellville, Illinois.

INDUSTRIAL INTELLIGENCE.

—By a supplementary ordinance the councils of Philadelphia grant large water consumers the option of paying according to measure of water consumed where objections may be made to the present levy of water rent. The ordinance is as follows:—

Supplement to an ordinance entitled "An ordinance for the government and protection of the department for supplying the city with water," approved June 1, A.D. 1871, to provide for the use of water meters by special agreement, and fixing the rates therefor.

The select and common councils of the city of Philadelphia do ordain, That when it shall be specially agreed upon between the water department and manufacturers or other large consumers to accurately determine the amount of water rent to be assessed, the chief engineer of the water department is hereby authorized to introduce meters into such premises, and the charge for water consumed as indicated by any meter, shall be at the rate of one dollar per one thousand cubic feet, payable quarterly.

—In the early part of July the Philadelphia market for pig-iron was dull for most every grade, and the prices were lower than anticipated, in consequence of purchases being made for immediate use only; but owing to the extent of orders in the hands of mill-men, there is a strong undertone with a slight advance. Scotch iron is in better demand, but very scarce; Eglington being the only brand in the market, has advanced \$2.00 per ton, and some is held at higher figures, but still less than present cost of importation. There has been considerable activity in merchant bar-iron, under an advance to 4.8, and in consequence of the rise in English bars 5c. per lb. has been asked, but no sales reported at the last figure. Wrought scrap is dull and slow sale. Old rails are in good demand, prices remaining nominal; an advance reported in foreign markets. We give weekly quotations:—

	July 6th.	July 13th.	July 20th.	July 27th.	
American No. 1. Foundry pig, at furnace....	\$53.00	\$50.00	\$50.00	\$51.00	
" No. 2. " "	51.00	48.00	48.00	48.00	
" No. 3. Forge pig "	46.00	46.00	46.00	50.00	
" No. 4. White & mottled "	42.00	42.00	42.00	42.00	
Scotch pig, (cargo lots for shipment).....	47.00	47.00	47.00	49.00	
Old rails, D. H.'s, (for shipment here).....	53.00	53.00	53.00	53.00 gold.	} T's 50c. per " " " } ton less.
" " (on the spot and for arrival).....	51.00	50.00	50.00	50.00	
No. 1. Wrought scrap, (ex. ship).....	50.00	50.00	50.00	50.50 currency.	
" " (for shipment here)....	57.50	57.50	57.50	57.50	"
American refined bar, (mill price).....	103.04			4.6	
	4.6	4.6	4.8	5	"
" common bar " "	90.00	90.00	90.00	90.00	"
" rails, (at mill).....	90.00	90.00	90.00	85.00	"
English rails, (ex. ship N.Y.).....	75.00	75.00	75.00	75.00 gold.	

—SUITABLE water conduits to buildings is a question of universal interest, and the inquiry attracts increasing attention. Lead has always seemed the most practical metal, but, unfortunately, the water passing through lead pipes will, by its action on the lead, become impregnated with deleterious substances. To obviate the danger incident to lead pipes, the interior of such pipes has been lined with tin, and if the pipe is perfectly covered with tin throughout its entire surface, and placed in contact with the waters of such wells or aqueducts as do not readily act upon tin, it will serve a good purpose for many years. Still, tin is often more readily attacked and dissolved by water than lead, and when placed in association with lead, if any water contact is made between the tin and the lead, both metals are dissolved with increased rapidity. "Block tin" supplies a good metal from which to construct water pipes. It has the disadvantage of being readily acted upon by some waters, but as the salts of tin are not specially poisonous, no harm can result from its solution in water. Block-tin pipes are, however, expensive.

Compound metals used for water pipes are viewed with disfavor. Some alloys resist oxidation or other chemical change in a most remarkable manner; yet change the proportion, and this is reversed. Aluminum and magnesium, when combined with each other, and with other metals in certain proportions, will oxidize so rapidly as to fall into a powder almost instantly; while in other proportions the compound resists the action of oxygen to a degree approaching that of the noble metals. A mixture of copper and zinc may possibly be devised, which, when formed into pipe, will convey water safely. A brass water pipe is now manufactured.

In seeking for a satisfactory material for water pipes, the curious vegetable substance, gutta-percha, has been used to some extent. It has much to recommend it to favor, but has objectionable features. Gutta-percha imparts to water in contact with it an unpleasant taste, and also, in some localities, it undergoes a kind of spontaneous decomposition, by which it is rendered worthless. If, however, these objections did not exist, its cost would drive it in a great degree from the market. Water, when it is brought in contact with the metal iron, oxidizes or rusts it more or less rapidly; but it is not rendered poisonous thereby. Neither the oxide, nor any salts of iron liable to be formed from water contact, are at all hurtful to the animal economy. The rust of iron, which sometimes is formed in considerable quantities, is liable, when the water is used for laundry purposes, to stain clothing. The fact that by rapid oxidation lead pipes are often speedily filled up or destroyed, may be regarded as the most weighty objection. In some localities, and under some circumstances, small service-pipes rust slowly, and will continue intact for many years; under other circumstances, they are soon destroyed. No iron pipe of less diameter than one inch should ever be used; those which are smaller soon fill up, and are rendered worthless. A good way to obviate the objectionable features of rust is to coat the interior with hydraulic cement. Iron pipes are "galvanized" by immersing the common gas pipes in hydrochloric acid, and then immediately placing them in a bath of melted zinc. The zinc amalgamates with the surface of the iron, forming a superficial covering to the metal. This was originally adopted with the view of preventing gas pipes from rusting in damp places. Such pipes were never designed to be used for the conveyance of water. Zinc is a coarse, cheap metal, easily oxidized or corroded by weak acids, and so acted upon, forms salts which are harmful. The thicker this coating, the longer the time consumed in removing it, and the larger the quantity of salts produced. Used for dry gas, above ground, iron pipes coated with zinc may have some slight advantage over the uncoated.

To overcome the various defects of metal pipes, the Glass-Lined Pipe and Tube Company of New York have introduced the patent glass-lined iron pipes. Through the pipes of this company the water comes in contact with nothing but glass, and cannot become impregnated with any oxide, as in all metallic pipes; there being no oxidation or corrosion, their purity and durability cannot be questioned. The inner surface of the pipes being perfectly smooth, there is no friction, and the flow of water is greater, and can be carried up in houses with less pressure than through any other pipe of the same diameter. The lining between the iron pipe and the glass tube inside consists of plaster-of-paris, a non-conductor of heat: this prevents the water therein from freezing in winter and keeps it cooler in summer, thus saving these pipes from bursting. The lining in the pipes is protected against any moisture by a layer of hydraulic cement, which is put on the end of each length of pipe, thus preventing the plaster-of-paris from being affected. The resisting power of the glass-lined pipe is five times greater than lead, and the difference in the expansion and contraction between iron and glass is overcome by the compressible plastic substance between the two materials. The glass-lined pipes are invaluable for conveying chemicals or any other liquids that are to be kept free from impurities, and also for ale and beer pumps, condensing of salt water on steamers, purifying gas, and for numerous other purposes. It is a fact well known, that quite a percentage of gas escapes through the pores of the iron. When lined with glass this waste is prevented, and the pipes rendered much more durable. Great expense for continual repairs is almost entirely overcome, and the cost of this pipe is not much above lead pipe.

—ALL over the world there is a great waste of labor and time by wheelbarrow and cart transportation. This is especially notable among large bodies of laborers in moving stone, great masses of earth, and other material. A temporary railway of wood, with cars, &c., taking the place of

such transportation, is by no means a new idea, but has never yet been made as practicable as it should be. It takes, as an average, two drivers, two horses, and two carts to move one cubic yard of earth; on a railroad, with a level grade, one driver and one horse will move five cars containing a cubic yard each; and there are instances in which such cars have been propelled by sail. As a further illustration of the waste of man-power, there are sixteen wheelbarrow loads of earth in a cubic yard, and these barrows require sixteen men—each performing two journeys to remove the cubic yard and return to place. A portable railroad, readily shifted to the locality of the work, substitutes a cheaper convenience for such a cumbrous and difficult process.

The idea of a railway of this description is met by Peteler's portable railway, which has now been tried for some years, and is found especially well adapted to the making of excavations, railroad beds, roads; for hauling coal, slate, &c., from mines and quarries; for filling low grounds, and ice-houses; for use in parks and cemeteries; and in working peat and cranberry bogs, brick-yards, and marl-pits, and constructing mill-dams, levees, military works, &c.

The main track is composed of twenty-foot sections; each section of two parallel wooden rails, bound together at proper distances by cross-ties, with a strong screw-tie bolt passing through each, and also with strong iron bolts to fit in the sockets secured on the ends of the rails, and all securely held by hooks and eyes to bind the sections together. To the upper surface of these wooden rails is riveted a strap of wrought-iron, oval on its upper surface, on which the car wheels run. Short pieces, single and double curves, cross-roads, turn-tables, &c., are provided, all furnished with hooks and eyes like the twenty-foot sections. The rails are laid on the surface of the ground, without sleepers, and with such rapidity that a thousand feet can be put down by two men, on level ground, in one hour, and taken up in a very short time. For short distances the cars can be moved by hand. On a long track one horse usually moves five cars. On down grades a horse will only be necessary to bring the empty cars back. The track, with all its appliances, can be easily transported on common wagons or railroad cars. To complete the road, curves, branch-roads, frogs, and turn-tables are added, whereby the road can assume everywhere and at all times the required form and shape. We were particularly struck with the working of the frog in switching the car either to the right or left of the main track. For the purpose of transporting, various kinds of cars are used, of a form suited to the different purposes for which they are employed, and being light and strong, they can be readily moved to any desired locality, and be used on steep grades without difficulty. The saving by the use of this road is in money and time—the former being from 25 to 100 per cent., and the latter from 100 to 300 per cent.

—To make the anvil-die of a steam hammer of the required strength—neither too hard nor too soft—is a point at which the makers have been long aiming. If too soft, the die mashes out; if too hard, it cracks from brittleness; everything depends upon the temperature at which the face of the die is chilled, and for success in this respect, Messrs. Ferrell & Burns, of Philadelphia, are now quite notable. Their dies, made from charcoal iron, are placed on hammers cast at some other works, thereby giving to such hammers a merit they did not originally possess. In architectural iron this firm fully keep pace with the rapid strides in this department of iron working. Among their minor castings are moulds for steel ingots, which are highly appreciated by steel manufacturers, and used at one of the best steel works in the State. This is a new foundry, started about a year ago, and already the demand upon it calls for an extension of its facilities.

—MR. GEORGE STARKEY, the sculptor of the marble works of H. S. Tarr & Son, Philadelphia, is now engaged on a bust of the late Zophar C. Howell. Both in design and execution, Mr. S. always satisfies the finest æsthetic taste and judgment. His statue of Ruth, exhibited early in the present year, was the admiration of thousands. For designs in marble, the works of Messrs. Tarr & Son are securing a great reputation. The model of the bronze statue of Samuel J. Reeves was also executed here. The prominent specialty of the establishment is cemetery statuary and monuments.

MONETARY.

THE dullness of June was aggravated to almost positive lethargy in the first half of July, in strictly financial circles. Money went to the banks and was kept there, and rates touched about the lowest possible quotations. In gold, however, there were movements springing from different conjectures as to its future position. Heavy coin exports followed the bank accumulation from July interest, and signs of a "corner" began to be manifest in New York, being a preparation for a possible squeeze when the slight merchandise exports of August and September shall make the coin temporarily scarcer. The state of exchange, with treasury gold receipts, do not, however, foreshadow a very long run to the upward gold movement.

Towards the close of July there were gleams of more active money, with hardening rates; the demand coming, however, from general business, rather than the stock exchanges. The most marked investment feature is increased dealings in railway bonds. Government bonds advance in sympathy with the gold rise and increased European purchases. The immense surplus subscription to the French loan has led to some consideration of the future European position of the United States bonds in competition with the French loan.

—Sales of Stocks, etc., at New York.

	July 8.	July 15.	July 22.	July 29.
U. S. 6's, coupon, 1881.....	117½	117¾	117¾	117¾
“ 5-20's, coupon, 1862.....	114¾	115¼	115½	115¾
“ 5-20's, coupon, 1864.....	114¾	115¼	115½	115¾
“ 5-20's, coupon, 1865, m & n.....	115¾	115¾	116	116½
“ 5-20's, coupon, 1865, j & jy.....	114¾	114¾	114½	114¾
“ 5-20's, coupon, 1867.....	115¾	115¾	115¾	115¾
“ 5-20's, coupon, 1868.....	114¾	114¾	115	115¾
“ 10-40's, coupon.....	112¾	112¾	112¾	112¾
Pacific 6's, currency.....	114¾	114¾	114¾	114¾
Tennessee 6's.....	74¾	74¾	74	74¾
“ 6's, new.....	74¾	74¾	74	74¾
North Carolina 6's.....	33¾	33	33¾	33¾
“ 6's, new.....	22	21	21¾	21¾
Missouri 6's.....	94¾	94¾	94¾	94¾
N. Y. Central and Hudson R. con.....	97¾	98	97¾	98¾
Harlem.....	.....	114¾	115¾	121
Erie.....	56¾	52¾	53¾	52
Lake Shore and Michigan Southern.....	93¾	92¾	92¾	92¾
Wabash.....	74¾	74¾	76¾	76¾
Cleveland and Pittsburgh.....	.....	.....	.....	.....
Northwestern.....	73¾	73¾	74¾	75¾
“ preferred.....	90¾	.....	91¾	91¾
Rock Island.....	111¾	111¾	111¾	112¾
Fort Wayne.....	96¾	97¾	97	97
Milwaukee and St. Paul.....	54¾	53¾	56¾	57¾
“ “ preferred.....	78¾	.....	79	79¾
Ohio and Mississippi.....	46¾	45¾	46¾	46¾
New Jersey Central.....	107¾	107¾	107¾	108¾
Western Union Telegraph.....	75¾	75¾	75¾	75¾
Pacific Mail.....	74¾	75¾	78¾	76¾

	July 8.	July 15.	July 22.	July 29.
Union Pacific.....	37½	37½	38½	37½
Adams Express.....	90	97½	98	98
Wells, Fargo & Co. Express.....	90	.....	89	89½
American Merchants Union Express.....	73½	73	74½	.....
United States Express.....	88	87½	85½	.....
Rate for Money.....	4@5	3@4	4	.....

Sales of Stocks, etc., at Philadelphia.

Gold.....	113½	114½	114½	114½
Sterling Exchange.....	124½	125½	125½	125½
Paris Exchange.....	4-59	4-56	4-56	4-55
Lehigh Valley Railroad.....	59½	59	59½	59½
“ “ 6's.....	98	98½	98	.....
“ “ 7's, reg.....	106	105½	105	105
Lehigh Navigation.....	44	43½	43½	43½
“ “ 6's, 1884.....	90	.....	90	90
“ “ 6's, g. ln.....	93½	92½	92½	92½
“ “ 6's, reg.....	96½	97	97	97
City 6's, no tax.....	100½	101½	101½	101½
“ tax.....	96½	97	97	97½
Pennsylvania Railroad.....	59	58½	59½	59½
“ “ 6's, 1 m.....	100	100	.....	100
“ “ 6's, 2 m.....	99	99	99	99
Pennsylvania 6's, w. ln.....	.....	.....	.....	.....
“ 6's, first series.....	100	100½	101	102
“ 6's, second series.....	103	105	106	106
“ 6's, third series.....	106½	107	107	108
“ 5's, coupon.....	.....	.....	.....	.....
Reading Railroad.....	58½	58	58½	57½
“ “ 6's, mt.....	.....	.....	.....	94
“ “ 7's.....	103½	103	103	102½
Catawissa Railroad.....	.....	.....	.....	14
“ “ preferred.....	45½	45	45	45
New York and Middle.....	.....	.....	.....	.....
North Pennsylvania Railroad.....	50	50	.....	.....
“ “ 6's, mt.....	100	100	100	100
“ “ 7's, mt.....	94½	97	.....	97½
“ “ 10's, chat.....	.....	.....	.....	.....
United N. J. Companies.....	126½	126½	126½	126½
“ “ 6's, mt., 1889.....	97	97½	97½	98
“ “ 6's, 1883.....	92½	93½	93	93
“ “ 6's, 1889.....	91	91	.....	90½
West Jersey Railroad 6's.....	93½	93½	93½	94
“ “ 7's.....	102	102	102	102½
Philadelphia and Erie.....	27½	26½	27	27½
“ “ 6's.....	.....	91½	91	.....
Allegheny County 5's, coupon.....	.....	75	.....	.....
Schuylkill Navigation.....	.....	.....	7½	7
“ “ preferred.....	15	15	15½	15½
“ “ 6's, 1882.....	78½	78½	79½	79½
Morris Canal.....	.....	.....	.....	.....
“ preferred.....	126	.....	.....	.....
“ 6's, 1882.....	93	93	93	93
Little Schuylkill Railroad.....	46½	46½	.....	46½
Oil Creek and Allegheny Railroad.....	37½	36½	36½	35½
“ “ 7's.....	80½	80	79	79½
Philada., Germ. and Nor. Railroad.....	88	87	87	88
Minehill Railroad.....	52½	52½	52½	52½
Elmira and Williamsport, preferred.....	40	40½	41	40
“ “ 7's.....	.....	.....	93	93
“ “ 5's.....	60	60½	60½	60
Northern Central.....	39½	39½	.....	.....
Fulton Coal.....	.....	.....	5	5
Rate for Money.....	5	5@6	5@6	5@6

NOTING AND COMMENTING.

PROMINENT among events abroad last month, was the decree of the emperor of Germany, promulgated on the 11th of July, banishing all members of the Society of Jesus from the empire, and providing for the disruption of their establishments within six months. The importance of this extreme measure on the part of Prince Bismarck becomes more apparent when it is remembered to how large an extent the schools and seminaries of south Germany—distinguishing these from the universities—are controlled by the Jesuits. When viewed as an act of intolerance rather than statesmanship, this measure of Bismarck does not find favor in Prussia. Suppression of the Jesuits by both papal and protestant governments is one of the most common facts in history; yet Prussia has always held for them, as educators, something of the old partiality of Frederick II. On the 23d ult., Sir Robert Peel called the attention of the English house of commons to the section of the Roman Catholic Relief Act of 1829, which provides for the banishment of those of the Jesuits who refuse to abjure the papal supremacy in secular affairs. Like many of the English statute laws, the provisions of this section have never been enforced: it is almost impossible to suppose that they ever will be in a constitutional government. It is said that the increase in the emigration from Germany to America has somewhat alarmed the imperial government, and that plans for diverting the movement are contemplated.

The month has been barren of incidents of any interest in English affairs. The struggles of the house of lords against the ballot bill have drawn upon it the description, by John Bright, of being the "resort of foolishness and fashion." It is probable, however, that the house will be satisfied with the concessions already made, and pass the bill as finally amended by the lords.

The continued scarcity of coal at possible prices has rendered the importation from Belgium unusually large.

Quite an excitement has existed in the English scientific world in reference to the treatment by Mr. Ayrton, the chief commissioner of public works, of Dr. Hooker, the well-known botanist, for many years identified with the management of the famous Kew gardens. Huxley, Darwin, Tyndall, and other eminent men have remonstrated in vain, and the matter, it is said, will be made the subject of debate in the house.

The "strikes" have been quite generally, and for the most part not unsatisfactorily, compromised. Great indignation is expressed at the protective policy pursued by M. Thiers, and the press teems with prophecies of the impending commercial downfall of France.

M. Thiers has achieved another hard-earned victory over his refractory assembly. His protective policy, distasteful

as it is to two sides of the chamber, has been carried to its full length, and on the 23d the first chapter of the bill taxing raw materials—flax, cotton, flax, hemp—was passed by a vote of 317 to 233, and on the 26th the entire tariff was passed by a much larger majority. The president delivered an elaborate and most carefully prepared speech in support of the measure, to which, in a considerable degree, the success of the bill is to be attributed.

The riots in the department of the Nord seem to have been suppressed with some difficulty.

The success of the new loan has been unprecedented, and goes far to show how determinedly the French people have addressed themselves to the task of meeting the accruing indemnity money and placing the government upon a sound financial basis. It demonstrates, moreover, how great the resources of the nation really are, and how slightly, comparatively speaking, they have been impaired by the war. The Berlin bankers subscribed largely, and the entire subscription is stated to have been 4½ milliards of francs, while the total sum of the loan was 3 milliards of francs. Whatever may eventually be the fate of the Thiers government, it has shown a strength and solidity that but few, even of its friends, supposed it to possess, and it has done admirably well its work of repairing and rebuilding the shattered organization of French society.

On the 25th of July, the duke of Guise, the son of the duke d'Aumale, died of scarlet fever.

Diplomatic relations with Mexico, so long interrupted, are now about to be resumed. This was made possible by the death of Juarez—the leader of Mexico in the ascendant.

A cowardly attempt—fortunately an unsuccessful one—to assassinate King Amadeus was made on the 19th ult., as the king and queen were returning at midnight to their palace. Investigation points to a conspiracy of some magnitude, and of a political character, as the origin of the attempt. Its only result seems to have been to draw out a good deal of latent loyalty, and the king is more popular than he has ever been before.

The Carlist bands, or the remnants of them, are flying in all directions, so that just at present the government is quite strong, and holds out promise of being permanent.

M. Catacary, the late eccentric minister from Russia to this country, has received his death-blow—politically speaking—in the shape of an imperial decree dismissing him from the diplomatic service. The other item of intelligence from Russia is of a less pleasant character. Advices from St. Petersburg state that the cholera is working its way rapidly across from eastern Russia to the central and western part of the empire. It seems clear that it has reached Moscow,

and that that unhappy city is now in the full possession of the epidemic.

There seems but little doubt of the occurrence of a war between Brazil and the Argentine confederation. Both countries are preparing for war, and large shipments of ammunition and arms are being made from both England and the United States.

—We notice a report that Mr. James Kelly, a wealthy citizen of Pennsylvania, has given \$50,000 to found a school in which boys shall be taught mechanical trades. If this statement is true, Mr. Kelly is the wisest and best almoner of his generation. It is impossible to conceive of an institution productive of more private and public good than the one here named, or one that more aptly supplies a pressing social want. There is a need of academies for the practical arts, as there is no equal need in any other department of life. Largely our youths are growing up useless; no adequate practice for education in the productive arts is furnished by a satisfactory apprenticeship system, and even, so far as employers are willing to give places to learners, they are obstructed by the monopolizing rules of trades unions, which heartlessly deprive the men of future years of the opportunities for exercising their best faculties in the earning of a livelihood. Besides its material utilities, such a school comes up to the intellectual phases of the time. We are about done with old ideas of learning—that is, learning which consists of curious acquirements and not knowledge. We learn things, not words. Scholarship does not now consist of philological details and rhetorical niceties, but of principles and laws in the cycles of nature's activities. Like the physicist, the mechanic is king in the future of ideas: we mean the mechanic who is really a mechanician versed in the rules of his art, and capable, by his education, of following its higher developments. The graduates of a school of mechanics will take a social rank that will banish the absurd opinion of any social inferiority of useful work, and the removal of any stamp of such inferiority means the improvement of the work by the advance of the workman.

A seminary is verbally defined, at times, as a place where a youth is instructed in such branches as may qualify him for his future employment; but our seminaries do not come up to such an interpretation, except in a very narrow circle of employment, yet this is the proper direction for our teaching to advance in. The seminary of practical art, as the sequel of the public grammar school, is a question to come before the public, and it will commend itself to the most thoughtful as a necessary part of adequate public instruction, as well as it commends itself to the charitable as the most advantageous subject for private benevolence.

—THE July report indicates a good yield of corn. The reports represent 989 counties, including an area usually producing 700,000,000 bushels annually, and indicating an increase of 3 per cent. This is equivalent to more than three-fourths of a million acres; and the total area in this great crop of the country, which nearly equals in extent the aggregate of all other tilled crops together, is probably about 35,000,000 of acres. Of the reports from 989 counties, 263 place the condition above 100; 413 below 100. The States making returns higher than 100 are—Vermont, 101; North Carolina, 101; Alabama, 110; Mississippi, 110; Louisiana, 119; Texas, 110; Kentucky, 103; California, 102.

As regards both winter and spring wheat, the average condition for the United States is almost exactly the same

as in June, or 94; 6 per cent. less than an average. The quality of the grain is uniformly superior in the Middle States. In Ohio, Michigan, and Missouri, and wherever inferior condition is reported, the straw is short, but the heads are generally long and well filled, the kernel plump and heavy. The quality of the southern wheat will probably prove as fine as any ever produced in that section, in threshing. The fulness of the heads in proportion to the quality of the straw, causes the yield to exceed the expectation, and may go far to offset the small decrease in the reported condition. It is quite probable that the general excellence of the grain will make the present crop of equal value to that of last year. There has been almost entire exemption from rust, and comparatively little complaint of insects.

—THE agents of two Belgian starch-makers, reports the British Trade Journal, with several wholesale and retail grocers, have just been prosecuted before the Paris court of correctional police for selling rice starch adulterated in the proportion of from 10 to 24 per cent. of potato flour and plaster-of-paris. A singular point in the case was that the charge was brought, not by the government or by a purchaser, but by a French starch-maker, on the ground of unfair competition, he pretending that his trade was prejudiced by the low price at which the spurious article was sold. He also claimed 100,000*f.* as damages. The packages of starch supplied by the Belgian defendants bore an English label, with the words "Rice Starch," or "English National Rice Starch," and the British royal arms. The court condemned the agents to two months' imprisonment each, and 50*f.* fine; the French wholesale dealers, who appear to have been aware that the starch was adulterated, to one month each, and a similar penalty; also four retailers to a fortnight's imprisonment and the same fine. The judge said that, even had the retailers not been informed of the quality of the article, which appears to have been the case, they would have been still liable. The question of damages was reserved.

—Now that the ghost of the "indirect damage" question has been laid, Americans are beginning to take an interest in the proceedings of the Geneva board of arbitration, whose real work is now little more than the ascertainment of the actual losses incurred by us. It is not as yet known by what principle the board will make this assessment of damages. The claims arising from the depredations of the privateers Boston, Sallie, Jeff Davis, Music, and the Joy, have been excluded by the commissioners, on the ground that the evidence fails to disclose negligence on the part of the English government.

—It has been ascertained that the electric current passes through the Atlantic cable at a velocity of from 7,000 to 8,900 miles per second. When the wires are suspended in the air, the rate is much greater, and the speed increases with the height of suspension. Thus, wires slightly elevated transmit signals at the rate of 12,000 miles per second, and over those suspended at a considerable height the electric current passes at a velocity of from 16,000 to 20,000 miles per second.

—SOME idea of the immense travel between Europe and the United States may be obtained by the reports of various lines of steamers engaged, by which it appears that, without including the ships of the French and German lines, 53 steamships, or nearly two a day, left Liverpool for America in May. Of these, 34 sailed for New York, 8 for Boston, 8 for Quebec and Montreal, and 3 to Halifax, Norfolk, and Baltimore. They brought over 32,000 passengers.

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